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Characterization of Exhaust Emissions from High Mileage Catalyst-Equipped Automobiles

Southwest Research Inst.
San Antonio, TX

Prepared for

Environmental Protection Agency
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Office of Mobile Source Air Pollution Control
Emission Control Technology Division
2565 Plymouth Road
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September 1981

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Characterization of Exhaust Emissions from High Mileage Catalyst-Equipped Automobiles

by

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Contract No. 68-03-2884
Task Specifications 7 & 10

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Prepared for

ENVIRONMENTAL PROTECTION AGENCY
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
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FOREWORD

These project tasks were initiated by the Control Technology Assessment and Characterization Branch, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105. The engineering and analytical effort on which this report is based was accomplished by the Department of Emissions Research of Southwest Research Institute, 6220 Culebra Road, San Antonio, Texas 78284. These projects, authorized by Task Specifications 7 and 10 under Contract 68-03-2884, were initiated on September 25, 1980 and March 16, 1981 and were completed June 1981.

The project was initially under the supervision of Mr. Charles Urban, Project Leader. Dr. Lawrence Smith, Senior Research Scientist, directed the project beginning March 10, 1981. Mr. Charles Hare was Project Manager and was involved in the initial technical and fiscal negotiations and subsequent major project decisions. The Project Officer throughout the project was Mr. Robert Garbe of the Control Technology Assessment and Characterization Branch, Environmental Protection Agency. The EPA Task Branch Technical Representative was Ms. Penny Carey. Dr. Frank Black and members of his staff, of the Environmental Protection Agency at Research Triangle Park in North Carolina, conducted the elemental analyses.

ABSTRACT

This report describes the laboratory effort to characterize regulated and unregulated exhaust emissions from ten 1978 and 1979 high mileage catalyst equipped gasoline automobiles which have been driven for approximately 50,000 miles. The ten automobiles were evaluated as-received and after a tune-up to manufacturer's specifications, over the Light-Duty Federal Test Procedure (FTP) and the Highway Fuel Economy Driving Schedule (HFET). Exhaust constituents measured, in addition to the regulated emissions, include: aldehydes, particulates, sulfides, amines, metals, and several additional elements and compounds. Additional evaluations involved the measurement of the regulated emissions over four short-test procedures.

SUMMARY

The major objective of these project tasks was to evaluate regulated and unregulated exhaust emissions, particularly aldehydes, from 1978 and 1979 catalyst-equipped automobiles that have been driven approximately 50,000 miles. The automobiles were tested as received and after a tune-up to manufacturer's specifications.

The study involved 10 automobiles: seven 1978 model year automobiles equipped with oxidation catalysts, one 1978 model year automobile equipped with a three-way catalyst and two 1979 model year automobiles equipped with three-way catalysts. Engine sizes ranged from a 98 CID, 4 cylinder engine to a 400 CID, 8 cylinder engine.

Unregulated emissions measured included: particulates, metals and other elements, aldehydes, organic sulfides, organic amines, ammonia, cyanides, hydrogen sulfide, and nitrous oxide. A number of the analytical procedures for these compounds were developed in previous projects.

The primary test sequences involved in this project were the light-duty Federal Test Procedure (FTP) and the Highway Fuel Economy Driving Schedule (HFET). In addition, hydrocarbons and carbon monoxide were measured in three short-test procedures. These short-test procedures included: the 50 mph Cruise Test, the 4-Mode Idle Test, and the Loaded 2-Mode Test. The basic requirements specified in the Code of Federal Regulations for certification of light-duty vehicles were followed for the primary test sequences.

A significant data base for the cars evaluated was generated in this project. These data were analyzed to the extent applicable and are presented in several different formats to facilitate their review and usage. The FTP overall averages for the ten cars as-received and after tune-up are summarized and compared to the results from previous related unregulated emission projects on the following page.

In general, the regulated and unregulated exhaust emission rates for the high-mileage catalyst-equipped cars are higher than the emission rates for the low-mileage catalyst-equipped cars, but the rates are considerably lower than the non-catalyst car rates. Aldehyde and ketone high-mileage catalyst-equipped car emission rates are only one tenth the aldehyde and ketone emission rates from the non-catalyst cars. Aldehydes and ketones appear to be reasonably well-controlled in the high-mileage cars.

	Average FTP Emission Rate, mg/km			
	Ten High Mileage Cars-This Project		Four 1970 Model Non-Catalyst Cars Previous Tasks[a]	Eight Low-Mileage Catalyst-Equipped Cars Previous Projects[b]
Emission	As-Rec'd	After Tune-Up		
Hydrocarbons	780	600	1,900	200
Carbon Monoxide	9,200	6,610	17,100	2,525
Oxides of Nitrogen	1,340	1,020	2,600	670
Total Particulates	49	32	99	8
Aldehydes & Ketones	6	4	37	2
Organic Sulfides	0.2	0.1	0.1	0.4
Organic Amines	<0.1	<0.1	<0.1	<0.1
Ammonia	7	9	4	12
Cyanide & Cyanogen	1	1	3	<1
Hydrogen Sulfide	<0.1	<0.1	<0.1	<0.1
Nitrous Oxide	46	36	--	22

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[a] Data for four 1970 model cars from Tasks 4 and 5 of this contract, EPA Report EPA-460/3-81-020

[b] Data for eight 1978 and 1979 model catalyst-equipped cars from previous contracts, 68-03-2499, 68-03-2588, and 68-03-2697. EPA reports EPA-460/3-80-003, -004, and -005.

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I. INTRODUCTION

This report describes the effort to characterize regulated and unregulated exhaust emissions from ten high mileage gasoline powered automobiles. The ten automobiles were catalyst equipped 1978 and 1979 models which had been driven for approximately 50,000 miles. This is the sixth project to be completed from among several related projects at SwRI involving the evaluation of a large number of unregulated emissions from gasoline automobiles. The previous projects involved evaluation of non-catalyst, oxidation catalyst and three-way catalyst gasoline automobiles.(1,2,3,4,5)*

A. Project Objective

The major objective of this project was to evaluate regulated and unregulated exhaust emissions, particularly aldehydes, from 1978 and 1979 catalyst-equipped automobiles that have been driven 50,000 miles. Emissions evaluated include the three currently regulated emissions (HC, CO, and NO_x), along with a significant number of currently unregulated compounds (e.g., aldehydes, sulfides, amines, ammonia, cyanide, etc.).

B. Emissions Measurement Procedures

The compound or groups evaluated, along with the sampling methods used, were as follows:

Sampling Methods	Compounds Evaluated
Bag	HC, CO, NO_x, CO_2, Individual HC and N_2O
Filter	Particulate, metals and other elements
Impinger	Cyanides, aldehydes, hydrogen sulfide, ammonia, and organic amines
Trap	Carbonyl and organic sulfides

The procedures for measuring the unregulated emissions were developed in another project and reported in a widely distributed interim report.(6)

C. Vehicles Evaluated

Ten 1978 and 1979 model automobiles were evaluated in this project. The automobiles evaluated included a 1978 Buick Regal, two 1979 Mercury

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*Superscript number in parentheses designate references at the end of the report.

Marquis, a 1978 Ford Granada, a 1978 Volvo 245DL, a 1978 Oldsmobile Cutlass, a 1978 Chevrolet Malibu (California certified), a 1978 Chevrolet Monte Carlo, a 1978 Ford Fiesta, and a 1978 Chrysler New Yorker. These automobiles were all equipped with catalysts and had been driven between 37,600 and 68,000 miles. These cars were either rented locally, tested in previous EPA projects, or owned by Southwest Research Center employees.

D. Vehicle Testing

The automobiles involved in this study were tested in duplicate as-received and in duplicate after a tune-up to manufacturer's specifications. The test sequence included the Light-Duty Federal Test Procedure (FTP)(7) and the Highway Fuel Economy Driving Schedule (HFET).(8) To the extent practical, all specified unregulated exhaust constituents were sampled and analyzed during every test. In addition, HC and CO emissions were measured in each configuration using three short-test procedures.

II. GENERAL EQUIPMENT, INSTRUMENTS, PREPARATIONS AND PROCEDURES

This section describes the automobiles, the fuel, the facilities, and the general instrumentation and procedures utilized in this project. The overall sampling systems for the unregulated emissions are also discussed.

A. Automobiles

Ten 1978 and 1979 gasoline-powered automobiles were evaluated in this project. These automobiles are described in Table 1. Several of the cars are shown in Figure 1. The majority of the cars were owned and operated by employees of the Southwest Research Institute or the Southwest Foundation for Research and Education. Three of the cars tested in the project, the two Mercury Marquis and the Ford Granada, were rented from local leasing agencies or car dealers. One car, the 1978 Chevrolet Malibu, was owned by a local citizen and had been tested new in a previous project.(1) The odometer mileage on the cars ranged from 37,600 to 68,000 miles.

B. Fuel

Throughout this project a single batch of Chevron UL-CQ26B1 unleaded gasoline, the type provided to auto manufacturers for emissions durability mileage accumulation tests, was used for all emission testing. This fuel had been used in previous unregulated emission projects involving low mileage catalyst cars. The fuel was used in this project so that the emissions data could be compared with the earlier work without introducing fuel effects. This gasoline is described in Table 2, and has a sulfur level of 0.03% as specified in Advisory Circular No. A/C 26B1. The hydrogen to carbon ratio was 1.89 and the SwRI identification number was EM-470. The fuel had lost some of the light ends during storage (RVP had dropped from 8.9 to 7). To correct this, n-butane was injected into the fuel to bring the RVP back up to the original value (8.9).

C. Dynamometer and CVS System

A Clayton Model ECE-50 chassis dynamometer with a belt-driven variable-inertia flywheel system, was utilized for all transient testing. This belt-driven inertia system simulates equivalent weight of vehicles from 680 kg (1500 lbs) to 2495 kg (5500 lbs), in 115 kg (250 lb) increments to 1360 kg, and in 225 kg increments above 1360 kg.

The constant volume sampler (CVS) used for these evaluations was SwRI CVS Number 2. This unit has a nominal capacity of 9.2 m^3/min (325 cfm). A nominal 460 mm (18 inch) diameter by 5 m (16 feet) long dilution tunnel was used between the intake filter and the CVS to enable sampling of particulates.

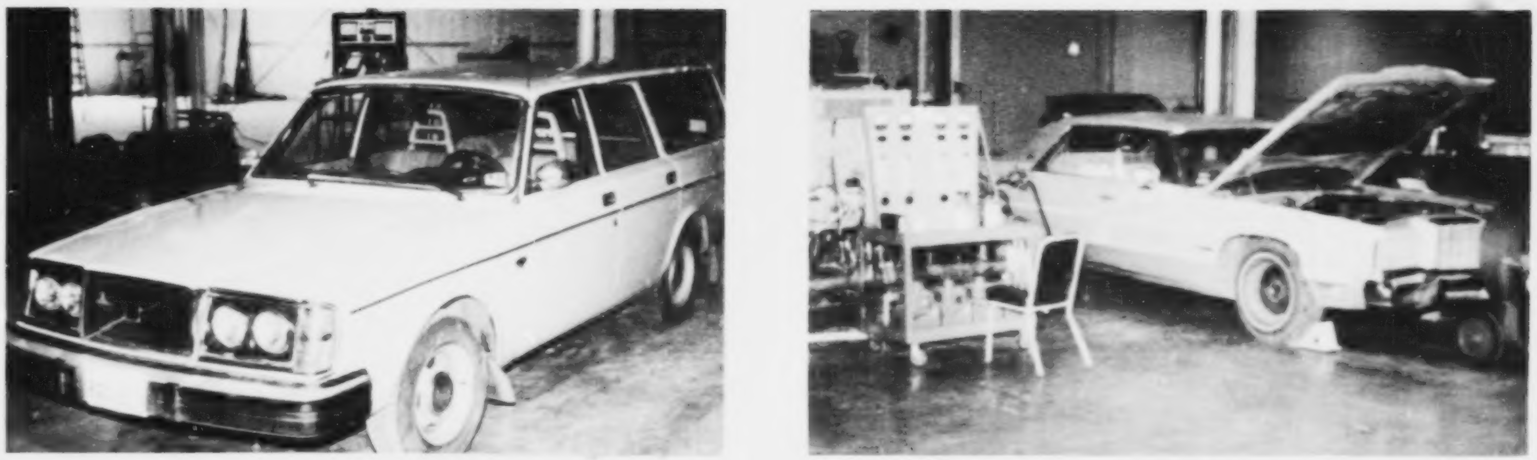
Partial views of the chassis dynamometer, the dilution tunnel and the intake to the CVS can be seen in Figure 2. Both the dynamometer

TABLE 1. AUTOMOBILES EVALUATED

Project Car No.	Year	Make	Model	Body Type	ID or Serial Number
01	1978	Buick	Regal	2-dr	4J47H8H148317
02	1979	Mercury	Marquis	4-dr	9Z62H619190
03	1979	Mercury	Marquis	2-dr	F9Z65H637732F
04	1978	Ford	Granada	2-dr	8W81F129943
05	1978	Volvo	245 DL	4-dr (wagon)	VC24545L1176861
06	1978	Oldsmobile	Cutlass	4-dr	3J09A8R467078
07	1978	Chevrolet	Malibu	2-dr	1W27U8Z434207
08	1978	Chevrolet	Monte Carlo	2-dr	1Z37A8K484268
09	1978	Ford	Fiesta	2-dr	GCFBTC96187
10	1978	Chrysler	New Yorker	4-dr	CS43N8C149448

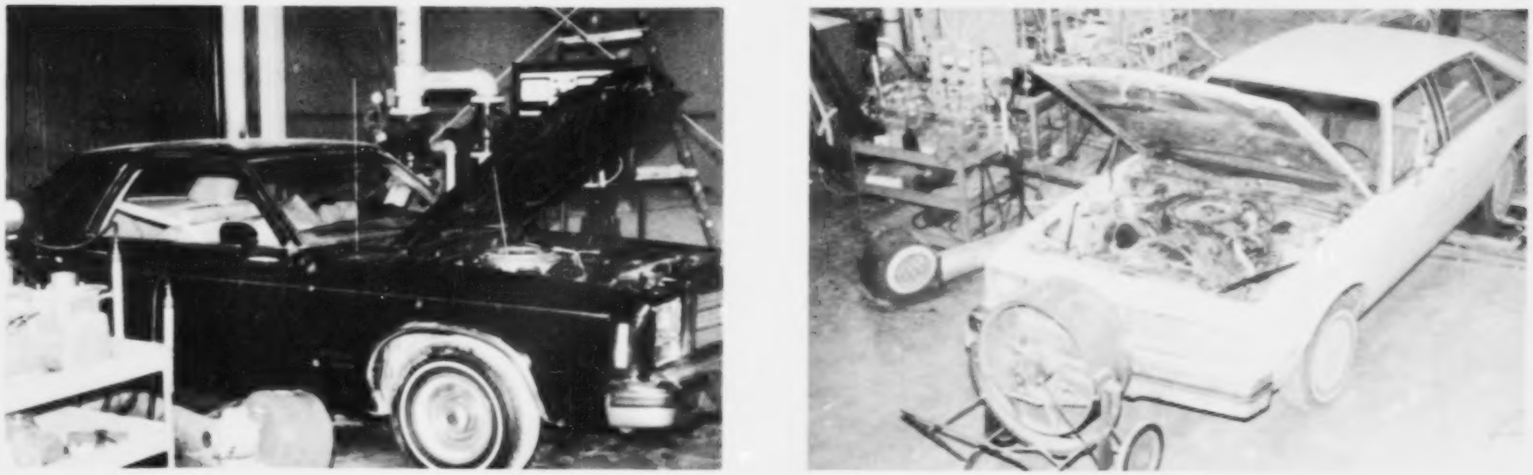
Project	Engine	Emission Controls			Transmission		Odometer
Car No.	CID/Cyl	Catalyst	Air Pump	EGR	Type/Gears	Accessories	Mileage
01	305/8	Oxidation	No	Yes	Automatic/3	PS,PB,AC	54,522
02	351/8	3-way	Yes	Yes	Automatic/3	PS,PB,AC	46,462
03	351/8	3-way	Yes	Yes	Automatic/3	PS,PB,AC,CC	48,766
04	302/8	Oxidation	Yes	Yes	Automatic/3	PS,PB,AC	56,993
05	130/4	3-way	No	No	Manual/4	PS,AC	59,031
06	231/6	Oxidation	No	Yes	Automatic/3	PS,PB,AC,CC	47,278
07	305/8	Oxidation	Yes	Yes	Automatic/3	PS,PB,AC	37,577
08	231/6	Oxidation	No	Yes	Automatic/3	PS,PB,AC	67,460
09	98/4	Oxidation	Yes	Yes	Manual/4	AC	67,963
10	400/8	Oxidation	No	Yes	Automatic/3	PS,PB,AC,CC	66,038

	Chassis Dynamometer Settings			
Project Car No.	Inertia Kilograms	Power Kilowatts	Inertia Pounds	Power Horsepower
01	1590	8.0	3500	10.7
02	2045	8.9	4500	12.0
03	2045	8.9	4500	12.0
04	1810	9.8	4000	13.2
05	1590	9.5	3500	12.8
06	1590	8.0	3500	10.7
07	1590	8.0	3500	10.7
08	1590	8.0	3500	10.7
09	910	4.0	2000	5.4
10	2275	8.4	5000	11.3



Car 05 - 1978 Volvo 245 DL

Car 10 - 1978 Chrysler New Yorker



Car 04 - 1978 Ford Granada

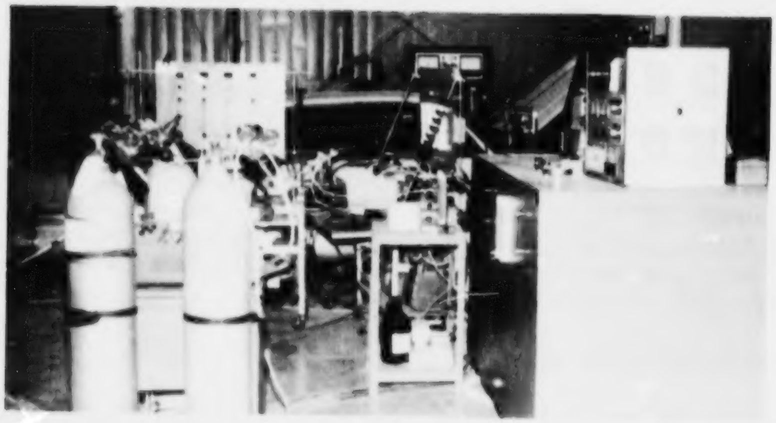
Car 06 - 1978 Oldsmobile Cutlass

Figure 1. Four of the 1978 cars evaluated in this project.

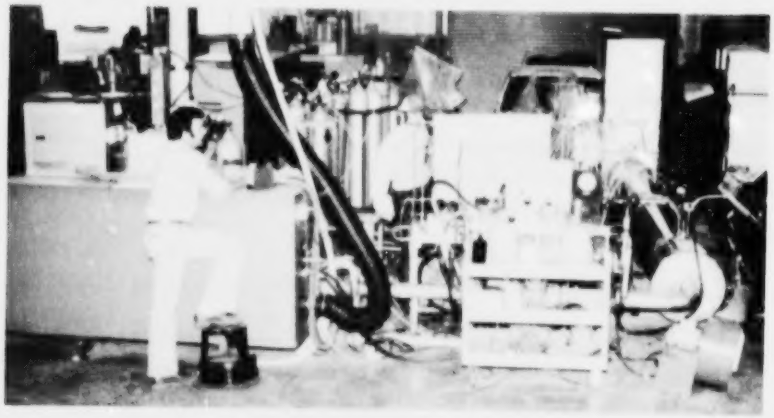
TABLE 2. DESCRIPTION OF CHEVRON UL-CQ26B1 UNLEADED GASOLINE

	Test Method	
Availability Date		April 24, 1978
Tank No.		94
Gallons		801,901
Gravity, °API at 60°F	ASTM D 1298	58.4
Research Octane No.	ASTM D 2699	91.6
Motor Octane No.	ASTM D 2700	83.2
Sensitivity		8.4
Lead, g/Gal.	ASTM D 3237	0.001
Sulfur, Wt %	X-Ray - ASTM D 2622 (Modified)	0.029
Phosphorus, g/Gal.	ASTM D 3221	0.0002
Manganese, g/Gal.	EAM 128-74	0.001
Gum, mg/100 mℓ	ASTM D 381	
Unwashed		85
Washed		0
Reid Vapor Pressure, psi	ASTM D 323	8.9
Distillation, °F (% Evaporated)	ASTM D 86	
IBP		97
10%		129
50%		212
90%		328
EP		386
Recovery, %		97.5
Residue, %		1.0
Loss, %		1.5
Acidity of Residue	ASTM D 1093	Pass
Hydrocarbons, Vol %	ASTM D 1319	
Aromatics		28
Olefins		8
Sturates		64
Benzene, Vol %	Chevron Research Technique	2.0
Water and Sediment, Vol %	ASTM D 2709	<0.001
Oxidation Stability, Hr	ASTM D 525	24+
Copper Corrosion	ASTM D 130	1A

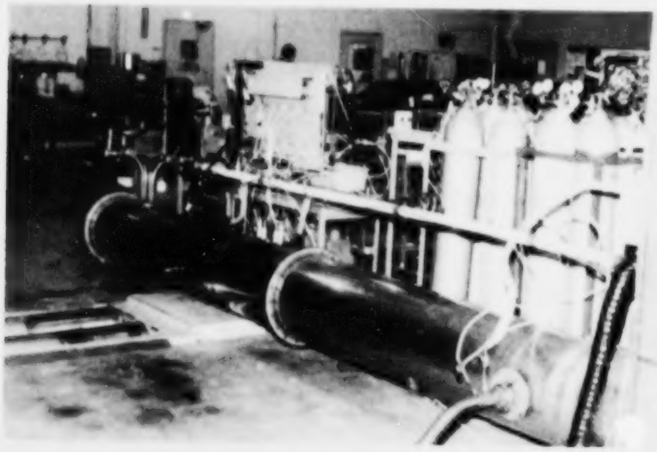
NOTE: These inspection data were provided by the Chevron Research Company.



A. CVS Side of System



B. Entire Sampling System



C. Dynamometer Side of the System

Figure 2. Views of the emissions sampling system.

and the CVS were calibrated, maintained and operated in accordance with the manufacturer's instructions and the appropriate sections of the Code of Federal Regulations applicable to light-duty vehicles.(7)

In addition to the 142 m^3/min (5000 cfm) cooling fan placed in front of the automobile, 42 m^3/min (1500 cfm) blowers were available to cool each rear wheel. These additional blowers were used only during the HFET driving cycle.

D. Exhaust Sampling and Analysis

A pictorial schematic of the exhaust and sampling system is shown in Figure 3. This system is in accordance with the guidelines established in previous unregulated emission projects conducted at SwRI for the EPA. The primary feature of this system is the number of sampling probes and systems required to collect all of the required unregulated emission samples. This is illustrated in the several views of the system shown in Figure 2.

This section has described the dilution tunnel and provided some insight into the overall sampling system assembly. More details on each of the individual sampling systems for the unregulated emissions are given in Section III.

E. Instrumentation for Regulated Emissions and Engine Parameters

Bagged samples of the dilute exhaust were evaluated for HC, CO, NO_x, and CO_2 using SwRI Bag Cart Number 1. This bag cart was designed, calibrated and operated in accordance with the appropriate sections of the Code of Federal Regulations applicable to light-duty vehicles.(7) In addition, the vehicle speed and the oxygen level in the undiluted exhaust were continuously recorded. The instrumentation used for these continuously recorded data were as follows:

Parameter Measured	Instrument or Method		
	Type	Make & Model	Ranges Used
O_2	Polarographic	Beckman 715	5 & 25%
Speed	---Parallel output from the Dynamometer Controls---		

The average oxygen level in the undiluted exhaust was obtained, by integration of the continuous oxygen signal, using an Acromag 1324-LY-1 integrator. The average oxygen level has only a gross relative meaning for most of these evaluations. Often, the oxygen level was relatively high when the exhaust flow was low (e.g., idle and cut-throttle) and relatively low when the exhaust flow was relatively high (e.g., highway speed). The integration of the oxygen in the undiluted exhaust does not compensate for these changes in exhaust flow. Is is possible to

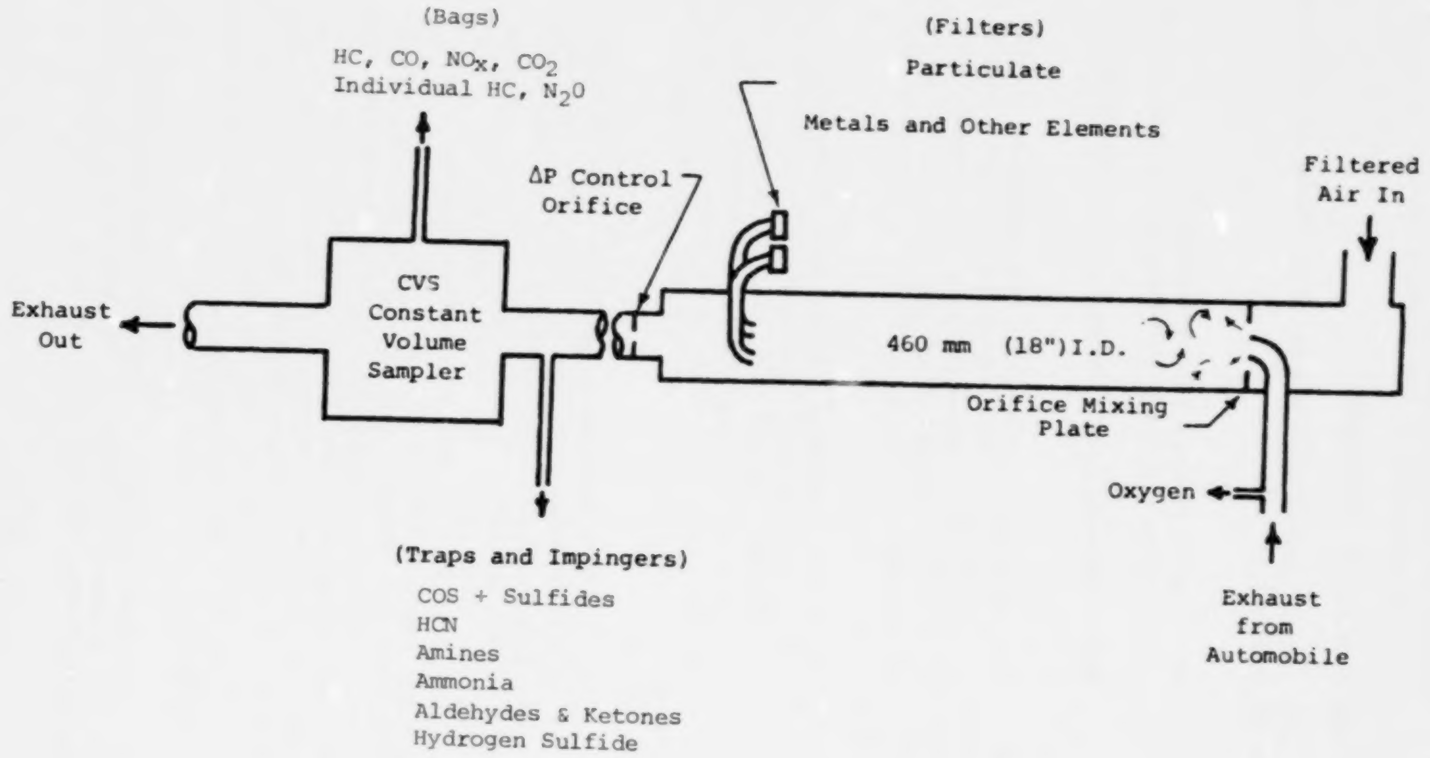

(Bags)
HC, CO, NO_x, CO_2
Individual HC, N_2O
(Filters)
Particulate
Metals and Other Elements
ΔP Control Orifice
Filtered Air In
CVS Constant Volume Sampler
Exhaust Out
460 mm (18")I.D.
Orifice Mixing Plate
Oxygen
(Traps and Impingers)
COS + Sulfides
HCN
Amines
Ammonia
Aldehydes & Ketones
Hydrogen Sulfide
Exhaust from Automobile

Figure 3. Gasoline engine emissions sampling system.

have a substantial average oxygen level and yet be deficient in oxygen over some portions of the driving cycle.

F. Emissions Test Procedures

The primary procedures and driving schedules utilized in this project are defined as follows:

FTP - 1979 Federal Test Procedure(7)
(uses the Urban Dynamometer Driving Schedule)

HFET - Highway Fuel Economy Driving Schedule(8)

Each of the two primary procedures and schedules, requiring emissions testing in this project (FTP and HFET), utilized bagged samples for evaluation of regulated emissions and fuel consumption. In addition, evaluation of the regulated emissions were conducted using several short-test procedures. These short-test procedures are discussed in Section II-H.

The HFET is a hot-start, single-segment driving cycle. The FTP, however, involves cold-start and hot-start, multi-cycle with multi-segement operation. In addition, in this project, a four-bag FTP was utilized for most of the unregulated emissions, rather than the three-bag FTP specified in the Federal Test Procedure. Therefore, before proceeding, it is important to clarify the meaning of FTP as used in this project.

FTP - The FTP uses the Urban Dynamometer Driving Schedules (UDDS) which is 1372 seconds in duration. The UDDS, in turn, is divided into two segments; a "transient" phase of 505 seconds and a "stabilized" phase of 867 seconds. The 1975 Federal Test Procedure consists of cold start "transient" and "stabilized" phases, followed by a hot start "transient". In this project, the hot start "transient" was followed by a hot start "stabilized". For the remainder of this discussion, and throughout this report, the four-cycle FTP will be identified as presented in Table 3. Therefore, with the assumption that the changes in distance traveled are negligible, the composite results with the four-cycle FTP relative to results with the three-cycle FTP will differ only as the mass emissions emitted during Cycle 4 differ from those emitted during Cycle 2. For the regulated emissions, the differences during Cycles 2 and 4 were small, and the overall effects of such differences were essentially negligible.

The test sequence followed for each automobile is given in Table 4. The sequence followed in the laboratory for running one set of emissions tests (FTP and HFET) is given in Table 5.

TABLE 3. DESCRIPTION OF FOUR-CYCLE FTP

	Four-Cycle FTP			
	Cold UDDS		Hot UDDS	
Cycle	1	2	3	4
Duration, seconds	505	867	505	867
Regulated Emissions, 3-Bag	X	X	X	
Regulated Emissions, 4-Bag	X	X	X	X
Unregulated Emissions:				
Bag	X	X	X	X
Impinger	---X---		---X---	
Trap	---X---		---X---	

NOTE: X designates a sample taken

A composite value in mass per distance for the three-cycle, three sample FTP regulated emissions is calculated using the following formula:

$$\frac{\text{MASS}}{\text{DISTANCE}} = \frac{0.43 \times (\text{MASS 1} + \text{MASS 2})}{(\text{DIST. 1} + \text{DIST. 2})} + \frac{0.57 \times (\text{MASS 3} + \text{MASS 2})}{(\text{DIST. 3} + \text{DIST. 2})}$$

Since the same driving cycle is involved, Distance 3 is essentially equal to Distance 1, and this equation can be reduced to:

$$\text{3-FTP M/D} \simeq \frac{0.43 \times (M1 + M2) + 0.57 \times (M3 + M2)}{D1 + D2}$$

For the four-cycle FTP, two sample, composite values determined in this project, the following formula was used:

$$\frac{\text{MASS}}{\text{DISTANCE}} = \frac{0.43 \times M(1 + 2)}{(D1 + D2)} + \frac{0.57 \times M(3 + 4)}{(D3 + D4)}$$

Since Distance 3 is equal to Distance 1 and Distance 4 is equal to Distance 2, this equation can be reduced to:

$$\text{4-FTP M/D} \simeq \frac{0.43 \times M(1 +2) + 0.57 \times M(3 +4)}{D1 + D2}$$

TABLE 4. TEST SEQUENCE FOR EACH AUTOMOBILE

Sequence	Operation Performed on Vehicle
Upon receipt	Drain and fill with test fuel, install and leak-check exhaust adapter
1	Run FTP, HFET - Sample and analyze emissions
2	Run FTP, HFET - Sample and analyze emissions
3	Run I/M Short tests
4	Tune up the engine. If any adjustments (other than up to 10% change in idle speed) or parts replacement are required, continue.
5	Run FTP, HFET - Sample and analyze emissions
6	Run FTP, HFET - Sample and analyze emissions
7	Run I/M Short tests
8	Fill with fuel and return to owner

FTP - Federal Test Procedure
HFET - Highway Fuel Economy Driving Schedule

TABLE 5. LABORATORY TEST SEQUENCE

1. Precondition, UDDS
2. Soak 12 to 20 hours
3. FTP - 4 bags for gaseous emissions
   2 filters or impinger samples
4. Engine Off - 10 minutes - Fan Off
5. HFET - 1 bag sample
   1 filter or impinger sample

NOTE: 5000 cfm fan on during all car operation. Additional tire and fuel tank cooling blowers on during all HFET operation.

The parameters of the two primary driving schedules are summarized in Table 6 and these schedules are illustrated in Figure 4. Other driving schedule designations frequently used are as follows:

Driving Schedule Designation Used	Other Common Designations
FTP	LA-4 and UDDS
HFET	FET

TABLE 6. SUMMARY OF DRIVING SCHEDULE PARAMETERS

Schedule	Duration, Seconds	Distance, Kilometers	Average Speed km/hr	Average Speed mph
FTP:				
505	505	5.8	--	--
867	867	6.2	--	--
UDDS	1372	12.0	31.4	19.5
HFET	765	16.5	77.6	48.2

G. Test Numbering System

The numbering system used in this project consists of three digits plus a cycle abbreviation. The designation used for all automobile testing was "VVT," followed by the individual test cycle abbreviation FTP or FET. The meaning of each letter is described as follows:

Code	Description	As Used in This Project
VV	Vehicle designation	01 thru 10
T	Test Series - As Received	1 and 2*
	- After Tune-up	6 and 7**

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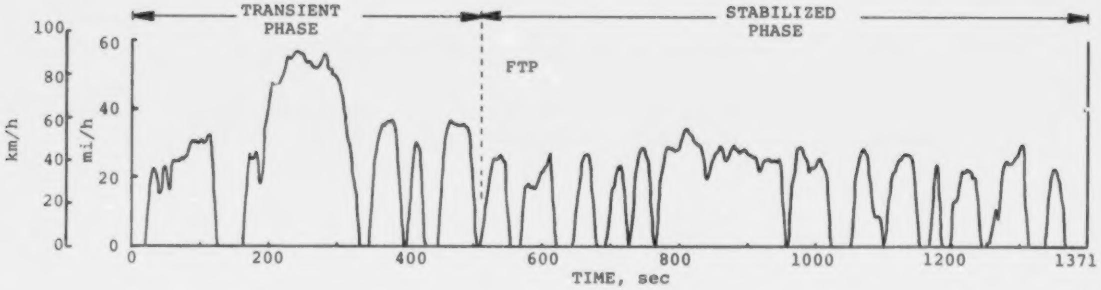
*1 and 2 are the initial and repeat test series for the vehicle as received,

**6 and 7 are the initial and repeat test series for the vehicle after tune-up. In one or two special cases, a higher number was used to designate a rerun.



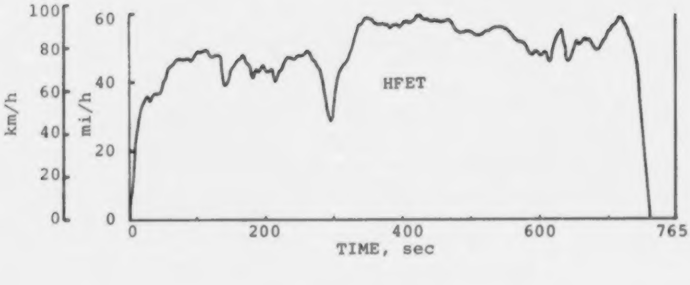


Figure 4. Driving cycle speed vs time traces

H. Short-Test Procedures

Regulated emissions were also evaluated over several I/M short-test procedures. These procedures are described by the data sheet in Appendix A-1, and are listed as follows:

- 50 mph Cruise Test
- 4-Mode Idle Tests
- Loaded 2-Mode Test
- Propane Gain Checks

All of these short-test procedures were conducted with the engine in a warmed-up operating condition. HC and CO emissions were measured in all, except the propane gain checks. The propane gain checks involved determination of change in engine idle speed as propane was inducted into the intake of the engine.

I. Computational Methods

The methods used for calculating the unregulated emissions results are given in Appendix A-2. All regulated emissions were calculated using the methods prescribed in the Code of Federal Regulations for Light-Duty Vehicles.(7) On the computer printouts for the regulated emissions (Appendix D), all items of potential interest are identified by descriptive headings. Items on the computer sheet identified only by abbreviated headings are used in calculating the unregulated emissions.

III. ANALYTICAL PROCEDURES FOR UNREGULATED EMISSIONS

The analytical procedures used to measure the unregulated emissions are summarized in this section. Detailed descriptions of most of the procedures, along with discussions of their development, validation, and qualification, are available in Interim Report II, "Analytical Procedures for Characterizing Unregulated Pollutant Emissions From Motor Vehicles," developed in a related EPA Project.(6)

A. Description of the Analytical Procedures

The unregulated emissions evaluated in this project, along with the methods for sampling and the procedures used in the analyses, are listed in Table 7. Organic amines, aldehydes and ketones, organic sulfides, individual hydrocarbons, and metals and other elements represent groups of compounds. The respective procedures separate and identify a number of individual components within each of these groups. The analytical procedures involved in this project are briefly described as follows:

Organic Amines - The collection of organic amines (monomethylamine, monoethylamine and dimethylamines, trimethylamines, diethylamine, and triethylamine) is accomplished by bubbling CVS-diluted exhaust through glass impingers containing dilute sulfuric acid. The amines are complexed by the acid to form stable sulfate salts which remain in solution. A portion of this solution is then injected into a gas chromatograph equipped with an ascarite loaded pre-column and a nitrogen-phosphorus detector (NPD). External amine standards in dilute sulfuric acid are used to quantify the results.

Ammonia - Ammonia in CVS diluted automotive exhaust is measured in the protonated form, NH_4+, after collection in dilute H_2SO_4. The acidification is carried out in a glass impinger maintained at ice bath temperature. A sample from the impinger is then analyzed for ammonia in an Ion Chromatograph and the concentration in the exhaust is calculated by comparison to an ammonium sulfate standard solution.

Aldehydes and Ketones - The collection of aldehydes (formaldehyde, acetaldehyde, isobutyraldehyde and hexanaldehyde) and ketones (acetone and methylethylketone) is accomplished by bubbling CVS diluted exhaust through glass impingers containing 2,4-dinitrophenylhydrazine (DNPH) in dilute hydrochloric acid. The aldehydes and ketones (also known as carbonyl compounds) react with the DNPH to form their respective phenylhydrazone derivatives. These derivatives are insoluble or only slightly soluble in the DNPH/HCl solution and are removed by filtration followed by pentane extractions. The filtered precipitate and the pentane extracts are combined and then the pentane is evaporated in a vacuum oven. The remaining dried extract contains the phenylhydrazone derivatives. The extract is dissolved in a quantitative volume of toluene containing a known amount of anthracene as an internal standard. A portion of this dissolved extract is injected into a gas chromatograph and analyzed for several individual aldehydes

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TABLE 7. SAMPLING AND ANALYSIS METHODOLOGY FOR UNREGULATED EMISSIONS

Compound	Sampling	Method of Analysis
Organic Amines	Impinger	Gas Chromatograph with ascarite precolumn and nitrogen-phosphorus detector (GC-NPD).
Ammonia (NH_3)	Impinger	Ion Chromatograph.
Aldehydes & Ketones	Impinger	Dinitrophenylhydrazone derivative. Gas chromatograph with flame ionization detector (GC-FID).
Hydrogen Sulfide (H_2S)	Impinger	Methylene blue derivative. Spectrophotometer.
Total Cyanide [Hydrogen Cyanide (HCN) and Cyanogen (C_2N_2)]	Impinger	Cyanogen chloride derivative. Gas chromatograph with electron capture detector (GC-ECD).
Carbonyl Sulfide (COS) and Organic Sulfides	Trap	Gas chromatograph with flame photometric detector (GC-FPD).
Individual Hydrocarbons	Bag	Gas chromatograph with flame ionization detector (GC-FID).
Metals and Other Elements	Filter	Weighed using microbalance. Spectral X-ray analysis at RTP.
Particulates	Filter	Weighed using microbalance.
Nitrous Oxide	Bag	Gas chromatograph with electron capture detector (GC-ECD).

and ketones using a flame ionization detector.

Hydrogen Sulfide - The collection of hydrogen sulfide is accomplished by bubbling CVS diluted exhaust through glass impingers containing a buffered zinc acetate solution which traps the sulfide ion as zinc sulfide. The absorbing solution is then treated with N,N-dimethyl-paraphenylene diamine sulfate and ferric ammonium sulfate. Cyclization occurs, forming the highly colored heterocyclic compound methylene blue (3,9-bisdimethyl-aminophenazothionium sulfate). The resulting solution is analyzed with a spectrophotometer at 667 nm in a 1-cm or 4-cm pathlength cell, depending upon the concentration.

Total Cyanide (Hydrogen Cyanide plus Cyanogen) - The collection of total cyanide is accomplished by bubbling CVS-diluted exhaust through glass impingers containing a 1.0 N potassium hydroxide absorbing solution. This solution is maintained at ice bath temperature. An aliquot of the absorbing reagent is then treated with KH_2PO_4 and Chloramine-T. A portion of the resulting cyanogen chloride is injected into a gas chromatograph equipped with an electron capture detector (ECD). External CN^- standards are used to quantify the results.

Carbonyl and Organic Sulfides - The collection of carbonyl sulfide (COS) and the organic sulfides methyl sulfide (dimethysulfide, $(CH_3)_2S$), ethyl sulfide (diethylsulfide, $(C_2H_5)_2S$) and methyl disulfide (dimethyldisulfide, $(CH_3)_2S_2$), is accomplished by passing CVS-diluted exhaust through Tenax GC traps at -76°C. At this temperature the traps remove the organic sulfides from the dilute exhaust. The organic sulfides are thermally desorbed from the traps into a gas chromatograph sampling system and injected into a gas chromatograph equipped with a flame photometric detector for analysis. External organic sulfide standards generated from permeation tubes are used to quantify the results.

Individual Hydrocarbons - For measurement of selected individual hydrocarbons, methane (CH_4), ethane (C_2H_6), ethylene (C_2H_4), acetylene (C_2H_2), propane (C_3H_8), propylene (C_3H_6), benzene (C_6H_6), and toluene (C_7H_8), a sample of CVS-diluted exhaust is collected in a Tedlar bag. This bagged sample is then analyzed for individual hydrocarbons using a gas chromatographic system containing four separate columns and a flame ionization detector. The peak areas are compared to an external calibration blend and the individual hydrocarbon concentrations are obtained using a Hewlett-Packard 3354 computer system.

Metals and Other Elements - The metals are collected as particulate on a 47 mm Fluoropore filter, which is then sent to Research Triangle Park (RTP) for analysis by X-ray spectroscopy. The diluted exhaust sample is taken from within the dilution tunnel. Weight gain on the filter is determined by weighing the filter on a microbalance before and after sampling.

Particulate - The "particulate" is collected on a 47 mm glass fiber filter. The amount of "particulate" collected is determined by weighing the filter on a microbalance before and after sampling.

Nitrous Oxide - For measurement of nitrous oxide, a sample of the CVS-diluted exhaust is collected in a Tedlar bag. This bagged sample is then analyzed for nitrous oxide using a gas chromatograph equipped with an electron capture detector. Calibration blends are used to quantify the results. Gas Chromatograph peak areas are obtained using a Hewlett-Packard 3354 computer system.

B. Validation and Qualification of the Analytical Procedures

The analytical procedures used in this project were subjected to a series of validation and qualification experiements in previous projects. Validation experiments included checks for sample stability, sample collection efficiency, detector linearity, interferences, and analysis repeatability. Qualification experiments included the injection of the compound of interest into the tunnel with and without the presence of exhaust and the subsequent recovery of that compound at the procedure sampling point.

Sample stability checks were performed using repeated analyses of the same sample at intervals over a specified period of time and comparing the results to the initial analysis. Organic amines, aldehydes and ketones, ammonia, total cyanide, nitrous oxide and individual hydrocarbon samples were found to be stable for several days. Carbonyl and organic sulfides and the hydrogen sulfide samples were found to be stable for approximately one day.

Sample collection efficiency experiments were performed by passing a known concentration of sample through a series of impingers or traps and analyzing each impinger or trap individually for the compound of interest. All of these procedures used in this project had a collection efficiency of 98% or better. Detector linearity experiments were performed by preparing several samples of various known concentrations and plotting the resulting peak areas versus the concentrations. The procedures had linear response over the range of interest in this project.

To determine interferences from other compounds, for each procedure, known exhaust components were introduced into the sample to determine their effect on the resultant measurements. To determine analysis repeatability, several samples of known concentrations were prepared and a number of complete analyses were performed at each concentration. The results of these tests were then compared to determine analyses repeatability.

The qualification experiments were performed to determine if the compounds of interest could travel the length of the dilution tunnel in the presence of dilute exhaust without significant loss by reaction with exhaust or the tunnel itself. The compounds were introduced at the same point at which the exhaust enters the tunnel and were sampled at the normal sampling point. Table 8 lists the procedures for which validation and qualification experiments have been performed.

C. Accuracy of the Analytical Procedures

A difficult, but very important, endeavor was the determination of procedural accuracy for each analytical method. The primary difficulty involved those procedures in which the exhaust compounds are trapped or absorbed, an extraction or subsequent reaction is performed, and then a portion of the extraction is analyzed. After much consideration, in previous unregulated emission projects, the decision was reached to initially define the accuracy in terms of a "minimum detection value" (MDV). The MDV, as used in this report, is defined as the value above which it can be said that the compound has been detected in the exhaust (i.e., at a measured value equal to the MDV, the accuracy is equal to plus or minus the MDV). Determination of accuracy over the entire range of each procedure was beyond the scope of these projects.

For compounds collected by bag samples, the MDV was determined from the instrument detection limits only, and is independent of the sampling rate and duration. For compounds which are concentrated in impingers or traps, the MDV is dependent on the instrument detection limit, chemical workup, sampling rate and sampling duration. The MDV's listed in Table 9 were derived using the listed sampling rate and a 23-minute sampling period.

TABLE 8. PROCEDURAL VALIDATION AND QUALIFICATION

Compound or Compound Group	Validation Conducted	Qualification Conducted
Organic Amines	Yes	Yes (significant tunnel losses)
Ammonia	Yes	Yes (significant tunnel losses)
Aldehydes & Ketones	Yes	Yes
Hydrogen Sulfide	Yes	Yes
Total Cyanide	Yes	Yes
Carbonyl Sulfide and Organic Sulfides	Yes	Yes (significant tunnel losses)
Individual Hydrocarbons	Yes	No[a]
Metals and Other Elements	No[a]	No[a]
Particulates	No[a]	No[a]
Nitrous Oxide	Yes	Yes

---

[a] Established procedure

TABLE 9. EMISSION PROCEDURAL SAMPLE RATES AND ACCURACY

	Mol. Weight	Sample Flow ℓ/100	$\mu g/m^3$ per ppm	Procedural Minimum Detection Values[a] ppm	Procedural Minimum Detection Values[a] $\mu g/m$	MDV for FTP mg/km[b]
Test Number, VVT	--	--	--	--	--	--
Barometer, mm HG	--	--	--	--	--	--
Humidity, g/kg	--	--	--	--	--	--
Temperature °C	--	--	--	--	--	--
Total Fuel Sulfur, mg/km	--	--	--	--	--	--
Avg. Exh. Oxygen	32.00	--	--	--	--	--
Catalyst Avg. Temp., °C	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--
Carbon Dioxide, g/km	44.01	Bag	--	--	--	--
Fuel Cons., ℓ/100 km	--	--	--	--	--	--
Regulated Emissions						
Hydrocarbons (THC)	11.88	Bag	575	1.0[c]	575	10
Carbon Monoxide	28.01	Bag	1165	2.0[c]	2330	40
Oxides of Nitrogen	46.01	Bag	1915	0.5[c]	958	16
Particulates						
Total Particulates	--	14.0	--	--	<50	<1
Compound Group Totals						
Aldehydes & Ketones	--	4.0	--	--	--	≈0.5
Individual Hydrocarbons	--	Bag	--	--	--	≈0.5
Organic Sulfides	--	0.13	--	--	--	≈0.05
Organic Amines	--	4.0	--	--	--	≈0.1
Other Compounds						
Ammonia	17.03	4.0	710	0.01	7	0.1
Cyanide & Cyanogen	26.02	4.0	1080	0.01	11	0.2
Hydrogen Sulfide	34.08	4.0	1415	0.01	14	0.2
Nitrous Oxide	44.02	Bag	1830	0.01	18	0.3

---

[a] Based on a 23-minute sampling period at the specified flow rate for all impinger, filter and trap collected samples.

[b] Based on $\mu g/m^3$ in the diluted exhaust and typical UDDS (FTP 505 and 867) parameters (1372 seconds, 206 m^3 CVS flow, 12.07 km, 0.98 DSFC).

[c] Based on the lowest instrument ranges used in this project.

TABLE 9 (Cont'd). EMISSION PROCEDURAL SAMPLE RATES AND ACCURACY

	Mol. Weight	CRC[d] Synonym	$\mu g/m^3$ per ppm	Procedural Minimum Detection Values[a]		MDV for FTP mg/km[b]
				ppm	$\mu g/m^3$	
Aldehydes and Ketones						
Formaldehyde	30.03	--	1250	0.01	15	0.2
Acetaldehyde	44.05	--	1830	0.01	20	0.3
Acetone[e]	58.08	2-Propanone	2415	0.01	25	0.4
Methylethylketone	72.12	2-Butanone	3000	0.01	30	0.5
Hexanaldehyde	100.16	Hexanal	4165	0.01	40	0.7
Individual Hydrocarbons						
Methane	16.04	--	665	0.05	30	0.5
Ethylene	28.05	Ethene	1165	0.03	30	0.5
Ethane	30.07	--	1250	0.03	30	0.5
Acetylene	26.04	Ethyne	1085	0.03	30	0.5
Propane	44.11	--	1835	0.02	30	0.5
Propylene	42.08	Propene	1750	0.02	30	0.5
Benzene	78.12	--	3245	0.02	30	0.5
Toluene	92.15	--	3830	0.02	30	0.5
Organic Sulfides						
Carbonyl Sulfide	60.08	--	2500	0.001	3	0.04
Methyl Sulfide	62.13	Dimethyl	2585	0.001	3	0.04
Ethyl Sulfide	90.19	Diethyl	3750	0.001	4	0.06
Methyl Disulfide	94.20	Dimethyl	3915	0.001	4	0.06
Organic Amines						
Monomethylamine	31.06	Amino-Methane	1290	0.002	3	0.05
Monoethylamine[f]	45.09	Amino-Ethane	1875	0.002	4	0.05
Trimethylamine	59.11	--	2460	0.002	5	0.08
Diethylamine	73.14	--	3040	0.002	6	0.10
Triethylamine	101.19	--	4205	0.002	8	0.14

---

[a] & [b] See initial page of this table.

[d] Handbook of Chemistry and Physics, 54th Edition.

[e] Includes Acrolein - 56.07 and Propionaldehyde - 58.08 (CRC - Propenal and Propanal, respectively).

[f] Includes Dimethylamine - 45.09.

IV. CAR SELECTION AND TESTING

Regulated and unregulated exhaust emissions were measured for ten high mileage catalyst equipped cars. The cars were tested as-received and after a tune-up to the manufacturers specifications. This section describes the selection and evaluation of the cars and presents the test results.

A. Car Selection

The cars tested in this program (Table 10) were either rented locally, tested in previous EPA projects, or were owned by Southwest Research Center (SwRI or SFRE) employees. The criteria for car selection were established in the project "Scope of Work" as follows:

- Vehicles should have an odometer reading of about 50,000 miles.
- Vehicles should be selected, if possible from engine and catalyst configurations evaluated at low mileage in previous EPA projects (EPA Report Nos. 460/3-80-003, -004, -005).

The cars that were evaluated in the previous EPA projects came equipped with pelleted and monolithic oxidation catalysts, three-way catalysts and three-way plus oxidation catalysts. These cars are listed below:

Car	Engine CID/Cyl	Catalyst
1978 Chevrolet Malibu	305/8	Oxi (Pelleted)
1978 Chevrolet Malibu (Calf. Cert.)	305/8	Oxi (Pelleted)
1978 Ford Granada	302/8	Oxi (Monolith)
1978 Ford Mustang	302/8	Oxi (Monolith)
1978 Ford Pinto (Calf. Cert.)	140/4	3-way + Oxi
1978 Pontiac Sunbird	151/4	3-way
1978 Saab 99	121/4	3-way
1979 Mercury Marquis	351/8	3-way + Oxi

Considerable effort was expended during the project to locate the cars previously tested in the malfunction projects. All of the cars located had considerably less than 50,000 miles on the odometer, including the California certified Chevrolet Malibu. However, since the Malibu was California certified with an air pump and was evaluated in a previous malfunction project, it was selected by the EPA Project Officer for inclusion in this project although it only had 37,600 miles on the odometer.

TABLE 10. CARS SELECTED FOR TESTING

Car No.	Car	Engine CID/Cyl	Catalyst	Mileage	Comment
01	1978 Buick Regal	305/8	oxidation	54,500	SFRE Employee Owned
02	1979 Mercury Marquis	351/8	3-Way	46,500	Rented Locally
03	1979 Mercury Marquis	351/8	3-Way	48,800	Rented Locally
04	1978 Ford Granada	302/8	oxidation	57,000	Rented Locally
05	1978 Volvo 245 DL	130/4	3-Way	59,000	SwRI Employee Owned
06	1978 Oldsmobile Cutlass	231/6	oxidation	47,300	SwRI Employee Owned
07	1978 Chevrolet Malibu	305/8	oxidation	37,600	Calif. Cert., Tested Previously in Contract 68-03-2499
08	1978 Chev. Monte Carlo	321/6	oxidation	67,500	SwRI Employee Owned
09	1978 Ford Fiesta	98/4	oxidation	68,000	SwRI Employee Owned
10	1978 Chrysler New Yorker	400/8	oxidation	66,000	SFRE Employee Owned

The majority of the cars tested in the program were owned by Southwest Research Center employees. A memorandum was sent to each of the over two thousand Southwest Research Center (SwRI and SFRE) employees to determine the availability of staff-owned cars for use in the project. A copy of the memorandum is included in Appendix A-3. Out of a total of thirty-nine replies, twenty-five were selected for further consideration. Six of the SwRI and SFRE employee-owned cars were selected for testing. The remaining three cars tested in the program, two Mercury Marquis and a Ford Granada, were rented from local leasing agencies or car dealers. Three of the these nine cars had slightly less than 50,000 miles on the odometer.

An effort was also made to obtain cars from California. Contacts primarily included rental agencies and car dealerships. Rental agencies generally no longer had any 1978 (or 1979) model year cars. The car dealerships and other contacts expressed complete lack of interest. It became apparent that the effort required to obtain cars from California would greatly exceed the proposed scope of the project. In addition, with the inclusion of the California Chevrolet Malibu with an air pump, and the Mercury Marquis and the Volvo with three-way catalysts, most types of emissions systems that were on the previously tested California cars were available for testing in this project.

Before a candidate car was selected for testing in the project, the following items were checked:

- Condition of engine - If any extensive maintenance was required, the car was not selected.
- Use of only unleaded fuel - Information from owner and from a tailpipe check using Plumbtesmo lead-sensitive paper. If a positive lead test was obtained, the car was not selected for testing.

In addition to meeting all of the specified requirements, the approval of the EPA Project Officer was obtained prior to final acceptance of each car.

B. Car Testing

Initially, the cars were to be tested in duplicate after draining the as-received fuel and performing any necessary maintenance or adjustments. However, after testing the 1978 Buick Regal, the number and sequence of the tests performed on each car was altered. The Buick Regal was in exceptionally good condition and the engine was well maintained. Except for a little higher than specified idle speed, the engine met all normal tune-up requirements. The FTP HC and CO emissions for this car, however, were relatively high as shown by the following test results:

Test	Emissions, g/km			Fuel ℓ/100 km
	HC	CO	NO_x	
011 FTP	1.16	15.8	0.93	14.0
012 FTP	0.95	13.3	0.95	13.9
011 FET	0.18	0.7	0.92	9.7
012 FET	0.18	0.6	0.85	9.5

In Table 11, the average of the FTP emissions results for the Regal are compared to the standards and the results from previous studies. The FTP emissions values on the Regal appear to be more in line with those values previously obtained on the noncatalyst Pacer, than those on the Malibu.

These results raised a number of questions which were discussed with the EPA Project Officer. Some of the primary factors were as follows:

- The car, as received, met all of the manufacturer's in-service, tune-up requirements, except for idle speed. Idle speed was a little high; apparently to achieve better idle quality.
- The idle-mixture adjusting screws were set maximum-rich, within the limit of the stops. This also was apparently done to improve idle quality. (At the specified idle speed and the new car idle mixture settings, the idle quality was somewhat undesirably rough).
- This idle-mixture setting was within the manufacturer's specifications and is probably representative of dealer inservice settings, based on the deterioration of idle quality at leaner mixture setting.

In accordance with instructions from the EPA Project Officer, all subsequent cars (Cars 2 through 10) were tested using the following test plan:

1. Duplicate tests on cars as-received.
2. Tune-up the engine (Scope of the tune-up is described in Appendix A-4).
3. If any adjustments (other than an up to 10% change in idle speed) or parts replacement are required, run an additional set of duplicate tests.

TABLE 11. CAR 01 EMISSIONS SUMMARY

Car	Description	Emissions, g/km HC	Emissions, g/km CO	Emissions, g/km NO_x	ℓ/100 km
FTP					
01	1978 Buick Regal	1.06	14.6	0.94	14.0
12	1978 Chevrolet Malibu	0.31	5.5	0.75	13.7
--	1978 Standards (or Cert.)	0.93	9.3	1.24	(13.8)
11	1978 AMC Pacer	0.73	11.1	1.21	--
121RBI[a]	1978 Chevrolet Malibu	1.08	26.0	0.57	14.7
HFET					
01 Avg.	1978 Buick Regal	0.18	0.67	0.89	9.6
12 Avg.	1978 Chevrolet Malibu	0.03	0.49	1.02	9.5
121RBI[a]	1978 Chevrolet Malibu	0.10	1.98	1.11	9.8

Car	HC Emissions, grams Bag 1	HC Emissions, grams Bag 2	HC Emissions, grams Bag 3	HC Emissions, grams Bag 4	CO Emissions, grams Bag 1	CO Emissions, grams Bag 2	CO Emissions, grams Bag 3	CO Emissions, grams Bag 4
01	11.7	6.0	3.0	2.9	260	54	19[b]	19[b]
12	6.8	0.3	0.8	0.2	130	3	13[b]	1[b]
121RBI[a]	9.7	6.6	3.6	5.9	230	170	72[b]	136[b]
11	6.5	3.4	4.2	3.2	144	50	34	35

---

[a] Rich Best Idle fuel/air mixture setting.

[b] The relationship of these Bag 3 and Bag 4 CO results show that idle mixture setting was not the cause of the relatively high CO emissions in the FTP with Car 01.

The number of tests performed in the project is summarized as follows:

Car	As Received Tests	After Tune-up Tests
01	2[a]	
02	2	
03	2	2
04	2	1[b]
05	2	2
06	2	2
07	2	2
08	2	2
09	2	1[c]
10	2	2

---

[a] Since the Buick Regal met all tune-up requirements, the two tests conducted were designated as-received tests.

[b] Carburetor was out of adjustment during second test. The test was not repeated as the first test after tune-up gave emissions similar to the as-received tests.

[c] First run after tune-up very similar to as-received emission rates, therefore test not repeated.

The tune-up adjustments and part replacements that were performed on Cars 03 through 10 are summarized in Table 12. Car 02, a 1979 Mercury Marquis did not require any significant adjustments or part replacements during tune-ups. The most common adjustment required was idle rpm. Part replacements included plugs, plug wires, air filters, EGR valves, a rotor, a distributor cap, and miscellaneous vacuum lines.

C. Regulated and Unregulated Emission Test Results

Summaries of the test results are included in Appendix B. Individual sample data for the FTP evaluations are included in Appendix C and the computer printouts for the regulated emissions are included in Appendix D. The analyses and discussion of these test results are included in Section V of this report. All FTP unregulated emissions data are based on appropriately weighted four-cycle FTP results. In the data tables, a double dash (--) has been used when no test data were available. This occurs for unregulated emissions when valid test data could not be obtained due to instrument malfunction or loss of the sample.

D. I/M Short-Test Procedure Results

Each car was evaluated over four short-tests after each set of as-received and after tune-up tests. Three of the short-tests involved

TABLE 12. SUMMARY OF TUNEUP ADJUSTMENTS AND PART REPLACEMENTS (CARS 3 - 10)

Car No.	03	04	05	06	07	08	09	10
Adjustment Required								
Idle RPM	8% High	12% High	17% High	13% High	26% High		14% Low	13% High
Ignition Timing						6° Low		4° High
Idle CO%			0.6% High					
Choke		✓						
Parts Replaced								
Plugs					✓	✓		
Air Filter	✓		✓		✓		✓	✓
Plug Wires	✓			✓		✓		
EGR				✓		✓	✓[f]	
Other	a			b,c,d		e		g,h

[a] Vacuum lines to temperature switch in the air cleaner reversed

[b] Line to EGR was plugged with sawed off top portion of a spark plug; line was connected properly and unbroken otherwise

[c] Vacuum line from base of carburetor to vacuum canister broken

[d] No. 1 plug loose

[e] PCV hose split, replaced

[f] EGR port on the intake manifold was plugged with carbon deposits, EGR was functioning but was replaced because of excessive carbon deposits

[g] Several brittle vacuum lines replaced

[h] Replaced rotor and distributor cap

measurement of HC and CO under steady state operating conditions. The other short test involved determination of maximum engine speed at idle with propane injection into the intake of the engine. The HC and CO emissions analyzers used are in a Beckman cart which was initially designed for and used in nine-mode heavy-duty engine evaluations. HC was measured as ppm Hexane.

The results of the short-test evaluations are reported in Appendix E and are summarized in Table 13. The larger increase in engine rpm, with propane enrichment after tune-up, reflects the fact that most of the cars were running slightly rich as received. Car 08, however, was adjusted extremely lean as received. With the exception of Car 10, the HC and CO values did not change significantly after tune-up. There was a significant decrease in idle CO and all HC values after the tune-up of Car 10.

TABLE 13. SUMMARY OF I/M SHORT TEST RESULTS

	Undiluted Exhaust Emissions			
	HC Emissions, ppm Hexane		CO Emissions, Percent	
	As-Received	After Tune-up	As-Received	After Tune-up
Car 01				
Idle	74		0.01	
2500 rpm	67		0.02	
30 mph	83		0.03	
50 mph	68		0.01	
Car 02				
Idle	90		0.06	
2500 rpm	67		0.02	
30 mph	91		0.01	
50 mph	73		0.00	
Car 03				
Idle	179	209	0.86	0.78
2500 rpm	98	93	0.27	0.26
30 mph	116	130	0.29	0.36
50 mph	63	58	0.01	0.00
Car 04				
Idle	97	109	0.02	0.00
2500 rpm	102	198	0.05	0.01
30 mph	221	175	0.02	0.01
50 mph	82	82	0.01	0.01
Car 05				
Idle	95	91	0.18	0.07
2500 rpm	75	84	0.17	0.07
30 mph	82	82	0.07	0.05
50 mph	62	69	0.02	0.01
Car 06				
Idle	64	71	0.01	0.01
2500 rpm	60	64	0.07	0.01
30 mph	69	60	0.01	0.01
50 mph	73	62	0.05	0.01
Car 07				
Idle	69	138	0.06	0.03
2500 rpm	64	152	0.02	0.03
30 mph	67	84	0.09	0.02
50 mph	60	67	0.01	0.03

TABLE 13 (Cont'd). SUMMARY OF I/M SHORT TEST RESULTS

	Undiluted Exhaust Emissions			
	HC Emissions, ppm Hexane		CO Emissions, Percent	
	As-Received	After Tune-up	As-Received	After Tune-up
Car 08				
Idle	95	92	0.04	0.02
2500 rpm	56	89	0.01	0.48
30 mph	58	67	0.00	0.01
50 mph	64	60	0.00	0.02
Car 09				
Idle	249	326	0.56	0.42
2500 rpm	102	152	0.03	0.10
30 mph	221	134	0.03	0.06
50 mph	109	107	0.00	0.00
Car 10				
Idle	483+	109	0.69	0.07
2500 rpm	483+	107	0.16	0.03
30 mph	483+	100	0.14	0.17
50 mph	483+	64	0.02	0.02

		Idle Propane Enrichment, rpm Increase	
Car	Gear	As-Received	After Tune-up
01	Neutral	60	
02	Neutral	40	
03	Neutral	10	10
04	Neutral	210	300
05	Neutral	200	240
06	Neutral	130	230
07	Neutral	20	170
08	Neutral	630	280
09	Neutral	15	40
10	Neutral	0	90
01	Drive	10	
02	Drive	0	
03	Drive	0	0
04	Drive	30	50
05	Drive	NA	NA
06	Drive	20	55
07	Drive	0	65
08	Drive	130	35
09	Drive	NA	NA
10	Drive	0	20

V. ANALYSES OF THE RESULTS

This section reports the analyses performed on the emissions data generated in the project. The analyses involved averaging and reformatting to enable making various comparisons of the data. Due to the very limited number of data points for each emission at each specific condition, advanced statistical analyses were judged to be inapplicable. In addition to presenting the data in formats that enable ready review and comparison, these results are also compared with results obtained in several previous related projects.

A Regulated Emissions and Fuel Consumption

The initial analyses of the data involved averaging the results for the duplicate as-received and for the duplicate after tune-up tests. These averages are given in Appendix F. A summary of the average regulated emissions and fuel consumption data is presented in Table 14.

Comparisons of the after tune-up emissions and fuel consumption with the corresponding as-received emissions and fuel consumption, for cars 03 through 10, are presented in Table 15. Cars 01 and 02 required little or no tune-up, therefore the as-received and after tune-up emissions and fuel consumption were essentially identical. Numbers less than one in Table 15 indicate a decrease in emissions and fuel consumption after tune-up. As shown in Table 15, cars 06, 08, and 10 gave the most significant changes in regulated emissions. Cars 06 and 08 had malfunctioning EGR valves which apparently caused high NO_x emission rates. Car 08 was also running extremely lean as-received. After replacement of the EGR valve, both cars had an approximate 70 percent decrease in the NO_x emission rates. In car 08, the hydrocarbon and carbon monoxide emission rates increased after tune-up; but the as-received emission rates were much lower than those for car 06 which had identical emission control devices and engine size. Both cars had similar emission rates after tune-up. Car 10 was running rich as-received and required a rotor and distributor cap replacement. Car 10, as-received, also had the highest hydrocarbon, carbon monoxide, and NO_x emission rates of the cars tested. The hydrocarbon, carbon monoxide, and NO_x emission rates were all lower after tune-up. Car tune-ups resulted in decreases in FTP carbon monoxide emission rates and fuel consumption for several of the ten cars.

Nine of the ten cars tested as-received in the program had one or more regulated emissions which exceeded the emission standards they were designed to meet. After tune-up, seven of the cars still had one or more emissions which exceeded the emission standards. The ratios of the as-received and after tune-up regulated emissions to the emission standards are presented in Table 16. This table indicates which cars had emission rates that exceeded the emission standards. As-received, five cars exceeded the hydrocarbon emission standard, three exceeded the carbon monoxide emission standard, and five exceeded the NO_x emission

TABLE 14. SUMMARY OF THE AVERAGE REGULATED EMISSIONS AND FUEL CONSUMPTION DATA

FTP

	HC (g/km)		CO (g/km)		NO_x (g/km)		Fuel Consumption (ℓ/100 km)	
	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up
Car 01	1.06		14.55		0.94		13.95	
Car 02	0.43		3.48		1.43		16.64	
Car 03	0.43	0.42	3.68	2.41	1.03	1.07	17.25	16.50
Car 04	1.08	1.12*	7.02	5.61*	0.62	0.67*	18.68	18.32*
Car 05	0.38	0.38	3.64	3.34	0.50	0.55	13.21	12.48
Car 06	0.54	0.48	9.11	8.52	2.16	0.68	12.42	12.77
Car 07	0.40	0.41	8.22	7.57	0.45	0.44	16.83	16.26
Car 08	0.28	0.52	3.07	9.10	2.09	0.71	12.78	12.60
Car 09	0.40	0.34*	1.60	1.38*	1.86	1.80*	7.73	7.61*
Car 10	2.84*	0.83	37.60*	10.15	2.28*	1.88	19.32*	17.93

HFET

	HC (g/km)		CO (g/km)		NO_x (g/km)		Fuel Consumption (ℓ/100 km)	
	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up
Car 01	0.18		0.67		0.89		9.60	
Car 02	0.16		0.29		1.27		10.79	
Car 03	0.17	0.11	1.59	0.40	1.56	1.43	11.09	10.68
Car 04	0.54	0.68*	2.47	1.79*	0.68	0.77*	12.35	12.36*
Car 05	0.24	0.24	1.54	1.17	0.29	0.30	7.82	7.81
Car 06	0.12	0.10	0.86	0.94	2.93	0.68	8.91	9.24
Car 07	0.11	0.13	1.45	1.60	0.37	0.36	10.60	10.91
Car 08	0.07	0.14	0.16	1.36	2.57	0.79	8.41	8.55
Car 09	0.14	0.10*	0.11	0.08*	2.08	1.77*	5.15	5.02*
Car 10	0.38*	0.15	2.33*	0.67	1.49*	1.23	12.25*	11.97

---

*Only one test point

TABLE 15. RATIO OF THE AFTER TUNE-UP REGULATED EMISSIONS AND FUEL CONSUMPTION TO THE AS-RECEIVED REGULATED EMISSIONS AND FUEL CONSUMPTION*

	FTP (After Tune-up/As Received)			
	Hydrocarbons	Carbon Monoxide	Oxides of Nitrogen	Fuel Consumption
Car 03	0.98	0.65	1.04	0.96
Car 04	1.04	0.80	1.08	0.98
Car 05	1.00	0.92	1.10	0.94
Car 06	0.83	0.94	0.31	1.03
Car 07	1.03	0.92	0.98	0.97
Car 08	1.86	2.96	0.34	0.99
Car 09	0.85	0.86	0.97	0.98
Car 10	0.29	0.27	0.82	0.93
	HFET (After Tune-up/As Received)			
Car 03	0.65	0.25	0.92	0.96
Car 04	1.26	0.72	1.13	1.00
Car 05	1.00	0.76	1.03	1.00
Car 06	0.83	1.09	0.23	1.04
Car 07	1.18	1.10	0.97	1.03
Car 08	2.00	8.50	0.31	1.02
Car 09	0.71	0.73	0.85	0.97
Car 10	0.39	0.29	0.83	0.98

---

*Numbers less than one indicate an improvement in emissions and fuel economy after car tune-up. Cars 1 and 2 required little or no tune-up, therefore emissions were not evaluated after tune-up.

TABLE 16. RATIO OF THE AS-RECEIVED AND AFTER TUNE-UP REGULATED EMISSIONS TO THE 1978 AND 1979 EMISSION STANDARDS[a]

	FTP Measured Emissions/FTP Emission Standard[b]					
	HC		CO		NO_x	
	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up	As-Rec'd	After Tune-up
Car 01	1.1	1.1[c]	1.6	1.6[c]	0.8	0.8[c]
Car 02	0.5	0.5[c]	0.4	0.4	1.2	1.2[c]
Car 03	0.5	0.5	0.4	0.3	0.8	0.9
Car 04	1.2	1.2	0.8	0.6	0.5	0.5
Car 05	1.5	1.5	0.7	0.6	0.5	0.6
Car 06	0.6	0.5	1.0	0.9	1.7	0.7
Car 07	1.5	1.6	1.5	1.4	0.5	0.5
Car 08	0.3	0.6	0.3	1.0	1.7	0.6
Car 09	0.4	0.4	0.2	0.1	1.5	1.5
Car 10	3.1	0.9	4.0	1.1	1.8	1.5

---

[a] Numbers greater than one indicate the vehicle emission rate exceeded the Emission Standard.

[b] Cars 01, 02, 03, 04, 06, 08, 09 and 10 compared to 1978/1979 Federal Emission Standards of 0.93 g/km HC, 9.32 g/km CO, and 1.24 g/km NO_x. Cars 05 and 07 compared to 1978 California Emission Standards of 0.25 g/km HC, 5.59 g/km CO, and 0.93 g/km NO_x.

[c] Cars 01 and 02 required little or no tune-up; therefore the after tune-up emission rates are equal to the as-received emission rates.

standard. After tune-up, four cars exceeded the hydrocarbon emission standard, three exceeded the carbon monoxide standard, and three exceeded the NO_x standard.

B. Aldehyde and Ketone Emission Rates

Five individual aldehydes and ketones were evaluated in this project: formaldehyde, acetaldehyde, acetone (includes propionaldehyde and acrolein), methylethylketone and hexanaldehyde. Acetone, methylethylketone and hexanaldehyde were detected only in small quantities, and randomly, in the exhaust of the ten high mileage cars. Only formaldehyde and acetaldehyde were consistently found in the exhaust. The formaldehyde, acetaldehyde, and total aldehyde rates are summarized in Table 17. The as-received and after tune-up averages for all ten cars indicate a small decrease in aldehydes after tune-up. The high mileage cars have aldehyde emission rates higher than those for corresponding new cars, but they are still well below the emission rates for non-catalyst cars. These comparisons are shown in Table 18.

C. Elemental Analysis Results

A summary of the elemental analysis results, for the FTP, is presented in Table 19. The emission rates are relatively low and are within the range encountered in previous projects involving oxidation and three-way catalyst cars.(1,2,3,4) There is no apparent relationship between the as-received and after tune-up emission rates.

D. Other Unregulated Emissions

The remainder of the unregulated emissions measured in this project are averaged and summarized in Table 20. The average emission rates (10 cars) for particulates, total organic sulfides and nitrous oxide decreased after tune-up, while the others remained unchanged or increased. Table 21 lists the number of cars which had emission rates decrease, increase, or remain unchanged after car tune-up. The emission rates decreased for five or more cars only in the case of particulates, organic sulfides, and nitrous oxide.

E. Comparison of Results with Previous Projects

In Tables 22 through 27, the emission rates of the ten 1978 and 1979 high mileage cars have been compared to the emission rates of equivalent or similar, but generally low mileage, cars tested in previous projects.(1,2,3,4) In Table 27, the emission rates for Cars 09 and 10 are compared to the average emission rates for four 1978 oxidation catalyst cars; since similar cars had not been tested in previous projects. To provide an overall comparison, the emission rates of the ten cars have been averaged and compared to the average emission rates of previously tested non-catalyst, oxidation catalyst, and three-way catalyst cars. These results are given in Table 28. In general, the average emission rates for the high mileage cars are higher, both as-

TABLE 17. AVERAGE ALDEHYDE EMISSION RATES FROM HIGH MILEAGE CATALYST CARS

	Average Emission Rate (mg/km)					
	FTP			HFET		
	Form-aldehyde	Acet-aldehyde	Total Aldehydes and Ketones	Form-aldehyde	Acet-aldehyde	Total Aldehydes and Ketones
Car 01	8.83	1.62	10.5	3.73	0.93	5.0
Car 02	0.00	0.30	0.3	2.14	0.00	2.2
Car 03 (As-Received)	2.88	1.03	3.9	0.00	0.00	0.0
Car 03 (After Tune-up)	0.94	0.00	0.9	3.24	0.00	3.3
Car 04 (as-Received)	5.38	1.14	6.5	3.59	1.14	4.8
Car 04 (After Tune-up)[a]	7.37	1.68	9.1	4.53	0.25	4.8
Car 05 (As-Received)	1.75	0.85	2.6	0.50	0.17	0.7
Car 05 (After Tune-up)	0.41	0.82	1.3	0.02	0.13	0.2
Car 06 (As-Received)	1.13	2.14	3.6	0.10	0.70	1.1
Car 06 (After Tune-up)	1.22	1.21	2.6	0.60	0.41	1.0
Car 07 (As-Received)	6.36	1.33	7.7	4.57	0.75	5.3
Car 07 (After Tune-up)	7.68	0.84	8.5	6.61	1.03	7.7
Car 08 (As-Received)	5.31	0.00	5.3	2.32	0.00	3.3
Car 08 (After Tune-up)	1.27	0.30	1.6	0.60	0.00	0.6
Car 09 (As-Received)	1.70	0.00	1.7	0.90	0.00	0.9
Car 09 (After Tune-up)	1.34	0.00	1.3	2.45	0.00	2.4
Car 10 (As-Received)[a]	17.01	2.82	19.8	6.44	1.66	8.1
Car 10 (After Tune-up)	5.81	0.18	6.0	1.68	0.40	2.1
Average All Cars[b] (As-Received)	5.04[c]	1.12	6.2	2.43	0.54	3.1
Average All Cars[b] (After Tune-up)	3.49[c]	0.70	4.2	2.56	0.32	2.9

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[a] Only one test point

[b] Data for Cars 1 and 2 used in both averages

[c] Values of 3.7 and 3.2 when data for Car 10 omitted

TABLE 18. COMPARISON OF AVERAGE FTP ALDEHYDE EMISSION RATES TO EMISSION RATES FROM PREVIOUS PROJECTS

	Emission Rates, mg/km							
	High Mileage Cars				Low Mileage Cars			
	Oxidation Catalyst		3-Way Catalyst				Non-Catalyst Cars	
	As-Rec'd	After Tune-Up	As-Rec'd	After Tune-Up	Oxidation Catalyst[a]	3-Way Catalyst[b]	1970[c]	1977[b]
Formaldehyde	7	5	2	<1	2	1	32	10
Acetaldehyde	1	1	1	<1	<1	<1	4	2
Total Adlehydes	8	6	2	1	2	1	37	13

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[a] Average for four 1978 oxidation catalyst-equipped cars in unmodified configuration, EPA Contract 68-03-2499

[b] Average for four 1978 and 1979 three-way catalyst-equipped cars in unmodified configuration, EPA Contracts 68-03-2588 and 68-03-2692

[c] Average for four 1970 non-catalyst cars, in unmodified configuration, EPA Contract 69-03-2884, Tasks 4 and 5

[d] Value from one 1977 non-catalyst car in unmodified configuration, EPA Contract 68-03-2499

TABLE 19. SUMMARY OF THE AVERAGE ELEMENTAL ANALYSES RESULTS FOR THE FTP

	Emission Rate, mg/km												
	S	Mg	Cl	Al	Zn	Si	Ca	Fe	P	Br	Mo[a]	W[a]	Sr[a]
Car 01	0.03	0.01	0.01	0.01	0.02	0.02	0.04	0.12	0.02	0.00	--	--	--
Car 02	0.37	0.00	0.01	0.01	0.00	0.11	0.02	0.20	0.00	0.00	--	--	--
Car 03 (As-Received)	0.12	0.00	0.04	0.03	0.00	0.16	0.02	0.50	0.01	0.17	--	--	--
Car 03 (After Tune-up)	0.20	0.01	0.01	0.11	0.00	0.10	0.04	0.95	0.02	0.04	--	--	--
Car 04 (As-Received)	0.07	0.00	0.02	0.01	0.02	0.92	0.06	0.54	0.02	0.12	--	--	--
Car 04 (After Tune-up)	0.13	0.02	0.01	0.01	0.07	0.16	0.04	0.43	0.05	0.13	--	--	--
Car 05 (As-Received)	0.05	0.01	0.05	0.02	0.00	0.04	0.12	0.50	0.02	0.21	--	--	--
Car 05 (After Tune-up)	0.04	0.01	0.01	0.00	0.00	0.02	0.09	0.21	0.02	0.20	--	--	--
Car 06 (As-Received)	0.04	0.01	0.00	0.03	0.01	0.01	0.04	0.37	0.03	0.09	--	--	--
Car 06 (After Tune-up)	0.04	0.02	0.01	0.03	0.02	0.03	0.17	0.20	0.02	0.06	--	--	--
Car 07 (As-Received)	0.10	0.02	0.02	0.03	0.03	0.09	0.22	0.32	0.02	0.00	0.27	0.00	0.16
Car 07 (After Tune-up)	0.10	0.01	0.01	0.02	0.01	0.01	0.08	0.10	0.01	0.00	0.28	0.00	0.19
Car 08 (As-Received)	0.06	0.01	0.01	0.04	0.01	0.02	0.06	0.49	0.01	0.00	0.17	0.02	0.12
Car 08 (After Tune-up)	0.03	0.01	0.01	0.02	0.01	0.01	0.05	0.09	0.00	0.00	0.23	0.03	0.14
Car 09 (As-Received)	0.26	0.00	0.00	0.01	0.01	0.02	0.06	0.05	0.00	0.00	0.25	0.00	0.15
Car 09 (After Tune-up)	0.08	0.00	0.01	0.01	0.04	0.00	0.08	0.19	0.02	0.00	0.18	0.05	0.16
Car 10 (As-Received)	1.28	0.37	0.46	0.21	1.95	0.40	1.93	9.23	1.20	0.02	0.51	0.13	0.30
Car 10 (After Tune-up)	0.28	0.12	0.08	0.02	0.20	0.06	0.53	0.49	0.26	0.00	0.28	0.04	0.16

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[a] These analyses not conducted for Cars 01-06.

[b] Car 10, as received, also had appreciable emission rates for lead (0.99 mg/km), sodium (0.28 mg/km), and manganese (0.29 mg/km).

S-Sulfur	Cl-Chlorine	Zn-Zinc	Ca-Calcium	P-Phosphorus	Mo-Molybdenum	Sr-Strontium
Mg-Magnesium	Al-Aluminum	Si-Silicon	Fe-Iron	Br-Bromine	W-Tungsten	

Note: With exception of lead, sodium and manganese emission rates for Car 10, compounds not included in this table had rates less than 0.05 mg/km and were found in exhaust of only four or less cars.

TABLE 20. AVERAGE UNREGULATED EMISSIONS DATA

	FTP Emission Rates, mg/km	
	Average for 10 Cars As-Received	Average for 10 Cars After Tune-up
Total Particulates	49	32
Compound Group Totals		
Organic Sulfides	0.2	0.1
Organic Amines	0.01	0.01
Other Compounds		
Ammonia	7	9
Cyanide and Cyanogen	1	1
Hydrogen Sulfide	0.03	0.03
Nitrous Oxide	46	36

TABLE 21. RELATIONSHIP OF THE AS-RECEIVED TO THE AFTER TUNE-UP FTP EMISSION RESULTS

	No. of Cars for which emissions Decreased after Tune-up	No. of Cars for which emissions Increased after Tune-up	No. of Cars for which emissions remained unchanged after Tune-up*
Total Particulates	5	3	2
Compound Group Totals			
Organic Sulfides	5	1	4
Organic Amines	1	0	9
Other Compounds			
Ammonia	4	4	2
Cyanide and Cyanogen	3	5	2
Hydrogen Sulfide	0	3	7
Nitrous Oxide	6	2	2

---

*Since Cars 1 and 2 required little or no tune-up, the as-received emissions and after tune-up emissions are assumed to be unchanged.

TABLE 22. COMPARISON OF CARS, 01, 06, AND 08 WITH RESULTS FROM PREVIOUS PROJECTS

	FTP Emission Rates in mg/km						
	Car 01 1978 Buick Regal	Car 06-1978 Olds. Cutlass		Car 08-1978 Monte Carlo		1978 Malibu Previous Project	
		As-Rec'd	After Tune-up	As-Rec'd	After Tune-up	Unmod.^{a}	Maximum^b
Regulated Emissions							
Hydrocarbons	1,060	540	475	275	520	310	1,780
Carbon Monoxide	14,550	9,110	8,520	3,070	9,095	5,540	26,020
Oxides of Nitrogen	940	2,155	680	2,090	710	750	1,110
Particulates							
Total Particulates	31	19	18	20	38	6	9
Compound Group Totals							
Aldehydes & Ketones	10	4	3	5	2	2	5
Organic Sulfides	0.2	<0.1	<0.1	0.1	0.1	0.5	1.2
Organic Amines	<0.1	0.0	0.0	0.0	0.0	<0.1	0.1
Other Compounds							
Ammonia	6	14	7	7	4	3	18
Cyanide & Cyanogen	2	6	2	1	2	1	3
Hydrogen Sulfide	0.0	0.0	<0.1	0.0	<0.1	0.0	0.1
Nitrous Oxide	26	145	43	39	32	41	57
	Fuel Consumption (ℓ/100 km)						
	14.0	12.4	12.8	12.8	12.6	13.7	14.7

Note: 1978 Federal Emission Standards in mg/km were: 932; 9,323; and 1,243 for HC, CO & NO_x

[a] Average emission rates (4 FTP's) for a 1978 Chevrolet Malibu with a 305 CID engine and w/o an air pump in unmodified configuration, EPA Contract 68-03-2499.

[b] Maximum emission rates for a 1978 Chevrolet Malibu with a 305 CID engine and w/o an air pump in modified or malfunction configuration, EPA Contract 68-03-2499.

TABLE 23. COMPARISON OF CARS 02 AND 03 WITH RESULTS FROM PREVIOUS PROJECTS

	FTP Emission Rates in mg/km					
	Car 02 1979 Marquis	Car 03 1979 Marquis		1979 Marquis Previous Projects		
	As-Rec'd	As-Rec'd	After Tune-up	Unmod.[a]	19,000 miles[b]	Maximum[c]
Regulated Emissions						
Hydrocarbons	430	420	420	130	230	1,800
Carbon Monoxide	3,475	3,680	2,410	1,630	1,340	52,410
Oxides of Nitrogen	1,430	1,030	1,065	830	1,010	2,510
Particulates						
Total Particulates	17	24	16	4	--	11
Compound Group Totals						
Aldehydes & Ketones	<1	4	2	3	5	3
Organic Sulfides	0.4	0.6	0.1	0.2	<0.1	0.6
Organic Amines	0.0	<0.1	<0.1	0.0	<0.1	<0.1
Other Compounds						
Ammonia	12	1	3	5	2	253
Cyanide & Cyanogen	0.1	0.1	0.3	0.3	0.9	112
Hydrogen Sulfide	0.0	0.0	0.0	0.0	0.0	1
Nitrous Oxide	59	53	49	24	37	88
	FTP Fuel Consumption (ℓ/100 km)					
	16.6	17.3	16.5	15.8	15.5	18.5

Note: 1979 Emission Standards in mg/km were:
930; 9,322 and 1,243 for HC, CO and NO_x

[a] Average emission rates (4 FTPs) for a 1979 Mercury Marquis in unmodified configuration, EPA Contract 68-03-2692

[b] Average emission rates (6 FTP's, 2 each for 3 fuels) for a 1979 Mercuey Marquis at 19,000 miles, EPA Contract 68-02-2497

[c] Maximum emission rate for a 1979 Mercury Marquis in unmodified or malfunction configuration, EPA Contract 68-03-2692

TABLE 24. COMPARISON OF CAR 04 WITH RESULTS FROM PREVIOUS PROJECTS

	FTP Emission Rates in mg/km			
	Car 04- 1978 Granada		1978 Granada Previous Project	
	As-Rec'd	After Tune-up	Unmod.[a]	Maximum[b]
Regulated Emissions				
Hydrocarbons	1,080	1,120	300	2,260
Carbon Monoxide	7,020	5,610	1,500	50,620
Oxides of Nitrogen	620	670	1,200	4,130
Particulates				
Total Particulates	36	44	8	18
Compound Group Totals				
Aldehydes & Ketones	7	9	3	10
Organic Sulfides	0.0	0.0	0.1	0.8
Organic Amines	0.0	0.0	<0.1	0.1
Other Compounds				
Ammonia	5	3	2	21
Cyanide & Cyanogen	0.6	1.0	0.2	1.5
Hydrogen Sulfide	0.0	0.0	0.0	0.7
Nitrous Oxide	7	6	21	60
	FTP Fuel Consumption (ℓ/100 km)			
	18.7	18.3	15.2	17.2

Note: 1978 Emission Standards in mg/km were: 930; 9,322; and 1,243 for HC, CO and NO_x.

[a] Average emission rates (4 FTP's) for a 1978 Ford Granada in unmodified configuration, EPA Contract 68-03-2499.

[b] Maximum emission rate for a 1978 Ford Granada in unmodified or malfunction configuration, EPA Contract 68-03-2499.

TABLE 25. COMPARISON OF CAR 05 WITH RESULTS FROM PREVIOUS PROJECTS

	FTP Emission Rates in mg/km				
	Car 05-1978 Volvo		1978 Saab Previous Projects		
	As-Rec'd	After Tune-up	Unmod.[a]	19,000 mi.[b]	Maximum[c]
Regulated Emissions					
Hydrocarbons	380	380	100	150	2,150
Carbon Monoxide	3,680	3,340	2,090	2,340	29,470
Oxides of Nitrogen	500	545	110	670	220
Particulates					
Total Particulates	8	2	5	-	17
Compound Group Totals					
Aldehydes & Ketones	3	1	< 1	2	3
Organic Sulfides	0.1	<0.1	0.3	<0.1	3.2
Organic Amines	0.0	0.0	<0.1	<0.1	<0.1
Other Compounds					
Ammonia	19	31	61	2	318
Cyanide & Cyanogen	0.7	0.9	1.1	2.4	67
Hydrogen Sulfide	0.0	0.0	0.1	0.0	6.6
Nitrous Oxide	106	123	11	22	23
	FTP Fuel Consumption (ℓ/100 km)				
	13.2	12.5	10.8	11.3	13.0

Note: 1978 California Emission Standards in mg/km were 255; 5594; and 932 for HC, CO and NO_x

[a] Average emission rates (4 FTP's) for a 1978 Saab 99 in unmodified configuration, EPA Contract 68-03-2588.

[b] Average emission rates (6 FTP's, 2 each for 3 fuels) for a 1978 Saab 99 at 19,000 miles, EPA Contract 68-02-2497.

[c] Maximum emission rates for a 1978 Saab 99 in unmodified or malfunction configuration, EPA Contract 68-03-2588.

TABLE 26. COMPARISON OF CAR 07 WITH RESULTS FROM PREVIOUS PROJECTS

	FTP Emission Rates in mg/km			
	Car 07- 1978 Malibu		Car 07 Previous Project	
	As-Rec'd	After Tune-up	Unmod.[a]	Maximum[b]
Regulated Emissions				
Hydrocarbons	400	410	185	1,240
Carbon Monoxide	8,215	7,565	2,158	52,930
Oxides of Nitrogen	450	440	425	1,395
Particulates				
Total Particulates	31	38	3	15
Compound Group Totals				
Aldheydes & Ketones	8	9	1	12
Organic Sulfides	0.1	<0.1	0.2	0.4
Organic Amines	0.0	0.0	<0.1	<0.1
Other Compounds				
Ammonia	3	13	5	12
Cyanide & Cyanogen	0.7	0.3	0.1	1.6
Hydrogen Sulfide	0.0	0.0	0.0	0.1
Nitrous Oxide	2	3	5	10
	Fuel Consumption (ℓ/100 km)			
	16.8	16.3	17.4	19.0

Note: 1978 California Emission Standards in mg/km were 255; 5594; and 932 for HC, CO, and NO_x

[a] Average emission rates (4 FTP's) for Car 07 in unmodified configuration, EPA Contract 68-03-2499 (Car 07 was known as Car 13 in Contract 68-03-2499).

[b] Maximum emission rates for Car 07 in unmodified or malfunction configuration, EPA Contract 68-03-2499 (Car 07 was known as Car 13 in Contract 68-03-2499).

TABLE 27. COMPARISON OF CARS 9 AND 10 WITH RESULTS FROM PREVIOUS PROJECTS

	FTP Emission Rates in mg/km					
	Car 09-1978 Fiesta		Car 10-1978 New Yorker		Four 1978 Oxid. Catalyst Cars, Previous Projects	
	As-Rec'd	After Tune-up[a]	As-Rec'd	After Tune-up	Avg. Unmod.[b]	Maximum[c]
Regulated Emissions						
Hydrocarbons	395	340	2,840	825	275	2,255
Carbon Monoxide	1,595	1,380	37,600	10,145	3,145	52,930
Oxides of Nitrogen	1,860	1,800	2,280	1,880	860	4,150
Particulates						
Total Particulates	35	33	264	83	6	18
Compound Group Totals						
Aldehydes & Ketones	2	1	20	6	3	12
Organic Sulfides	<0.1	<0.1	<0.1	<0.1	0.3	1.0
Organic Amines	0.0	0.0	0.0	0.0	<0.1	0.1
Other Compounds						
Ammonia	2	2	3	4	3	57
Cyanide & Cyanogen	0.2	0.4	1.9	0.2	0.4	6
Hydrogen Sulfide	0.0	0.0	0.3	0.3	<0.1	0.7
Nitrous Oxide	9	7	13	13	26	60
	Fuel Consumption (ℓ/100 km)					
	7.7	7.6	19.9	17.9		

Note: 1978 Federal Emission Standards in mg/km were: 932; 9323; and 1243 for HC, CO and NO_x.

[a] Only one test point

[b] Average emission rates of four 1978 oxidation catalyst cars tuned to manufacturer's specification, EPA Contract 68-03-2499.

[c] Maximum emission rate in unmodified or malfunction configuration for four 1978 oxidation catalyst cars, EPA Contract 68-03-2499.

TABLE 28. COMPARISON WITH RESULTS FROM PREVIOUS PROJECTS

	Average FTP Emission Rates, mg/km					
	High Mileage Cars		Oxid. Cat.	3-Way Cat.	Non-Catalyst	
	As-Rec'd	After Tune-up	1978[b]	1978 & 1979[b]	1970[a]	1977[b]
Regulated Emission						
Hydrocarbons	780	600	280	120	1,900	730
Carbon Monoxide	9,200	6,610	3,150	1,900	17,100	11,100
Oxides of Nitrogen	1,340	1,020	860	480	2,600	1,210
Total Particulates	49	32	6	9	99[c]	31
Compound Group Totals						
Aldehydes & Ketones	6	4	3	1	37	13
Organic Sulfides	<1	<1	<1	<1	<1	<1
Organic Amines	<1	<1	<1	<1	<1	<1
Other Compounds						
Ammonia	7	9	3	21	4	3
Cyanide & Cyanogen	1	1	<1	<1	3	2
Hydrogen Sulfide	<1	<1	<1	<1	<1	<1
Nitrous Oxide	46	36	26	17	--	3

---

[a] Data for four 1970 model cars from Tasks 4 and 5 of this contract

[b] Data for one 1977 non-catalyst, four oxidation catalyst, and four 3-way catalyst cars are from previous contracts, 68-03-2499, 68-03-2588, and 68-03-2697

[c] Leaded fuel used in the 1970 cars and unleaded fuel in all others

received and after tune-up, than the rates for the low mileage oxidation and three-way catalyst cars. However, the rates for the high mileage cars are lower than the rates for non-catalyst cars. Compared to the low mileage catalyst equipped cars, the high mileage cars produced particulate emission rates five times higher; hydrocarbon, carbon monoxide and aldehyde emission rates three times higher; and NO_x and nitrous oxide emission rates two times higher.

F. Relative Importance of the Emission Rates

There are established automotive source emission standards for HC, CO, and NO_x. Such standards can be utilized in a comparative analysis of the emission results for those compounds. For other compounds evaluated, however, attempted analysis of relative importance requires the application of some other available criteria. The criteria utilized in the previous projects were the Threshold Limit Values (TLV).(1) In brief, the criteria and procedure are described as follows:

> The maximum emission rates (MER) are converted to an equivalent maximum emission concentration (MEC) in the undiluted exhaust. This MEC is then compared to the TLV. The TLV is the limit established by OSHA for exposure by a worker in any eight-hour work shift. The conversion from an emission rate in g/km to mg/m^3 was determined by the total volume of the undiluted exhaust and the total distance driven for each test. The volume of undiluted exhaust differs for each car, generally as a function of the fuel consumption rate.

The maximum emission rates are summarized and compared to the TLV in Table 29. This table also includes the overall average emission rates for the ten cars as received. These values are intended to provide some idea of the relative importance, based on toxicity, for some of the compounds evaluated. It should be emphasized, however, that definite conclusions are currently inappropriate for any compounds, except possibly those for which automotive source emission standards have been established. It should be recognized that the hazard level of a compound may change based on new findings in health effects research. This is especially a factor when a compound is changed from a toxic concern to a carcinogenic concern, such as is apparently occurring with formaldehyde.

On the basis of comparisons of the maximum and the overall average emissions rates to the threshold limit values, the currently regulated CO and NO_x emissions appeared to be the most significant. Next in significance appeared to be formaldehyde; again, this significance is based on the toxicological properties of formaldehyde rather than its potential carcinogenicity.

TABLE 29. RELATIVE IMPORTANCE OF FTP EMISSION RATES

	Maximum Emissions					
	Emission Rate (ER) in mg/km	Car No.	Equivalent ER in Undiluted Exhaust in mg/m^3 (EC)[a]	Threshold Limit Value (TLV in mg/m^3)		Ratio of EC to TLV
				OSHA (9)	R[b]	
Regulated Emissions						
Hydrocarbons	2,840	10	1,600	--	--	--
Carbon Monoxide	37,600	10	20,700	55	--	375
Oxides of Nitrogen	2,280	10	1,300	9	--	145
Total Particulates	264	10	145	--	--	--
Compound Group Totals						
Aldehydes & Ketones	20	10	11	--	--	--
Organic Sulfides	0.6	03	0.3	--	10	<1
Organic Amines	<0.1	01	<0.1	--	>10	<1
Other Compounds						
Ammonia	31	05	23	35	--	1
Cyanide & Cyanogen	6	06	5	--	5	1
Hydrogen Sulfide	0.3	10	0.1	--	10	<1
Nitrous Oxide	145	06	123	--	--	--
Formaldehyde	17	10	9	4	--	2
	Average Emissions (as-Received)					
Regulated Emissions						
Hydrocarbons	780	--	570	--	--	--
Carbon Monoxide	9,200	--	6,720	55	--	120
Oxides of Nitrogen	1,340	--	980	9	--	110
Total Particulates	49	--	36	--	--	--
Compound Group Totals						
Aldehydes & Ketones	6	--	4	--	--	--
Organic Sulfides	0.2	--	0.1	--	10	<1
Organic Amines	<0.1	--	<0.1	--	>10	<1
Other Compounds						
Ammonia	7	--	5	35	--	<1
Cyanide & Cyanogen	1	--	0.7	--	5	<1
Hydrogen Sulfide	<0.1	--	<0.1	--	10	<1
Nitrous Oxide	46	--	34	--	--	--
Formaldehyde	5	--	4	4	--	1

---

[a] Derived on a wet basis using the following approximate calculations: mg/m^3 = Conversion Factor × mg/km. CF = Distance × Dilution Factor ÷ Volume

[b] Based on values for some similar or related compounds as set by OSHA (9) or recommended by the 1968 American Conference of Governmental Industrial Hygienists (10)

LIST OF REFERENCES

1. Urban, C.M., "Regulated and Unregulated Exhuast Emissions from Malfunctioning Non-Catalyst and Oxidation Catalyst Gasoline Automobiles," Final Report to Environmental Protection Agency under Contract No. 68-03-2499, January 1980.

2. Urban, C.M., "Regulated and Unregulated Exhaust Emissions from Malfunctioning Three-Way Catalyst Gasoline Automobiles," Final Report to Environmental Protection Agency under Contract No. 68-03-2588, January 1980.

3. Urban, C.M., "Regulated and Unregulated Exhaust Emissions from a Malfunctioning Three-Way Catalyst Gasoline Automobiles" Final Report to Environmental Protection Agency under Contract No. 68-03-2692, January 1980.

4. Smith, L.R., "Characterization of Emissions from Motor Vehicles Designed for Low NO_x Emissions," Final Report to Environmental Protection Agency under Contract No. 68-02-2497, July 1980.

5. Urban, C.M., "Unregulated Exhaust Emissions from Non-Catalyst Baseline Cars Under Malfunction Conditions," Final Report to Environmental Protection Agency under Tasks 4 and 5 of Contract No. 68-03-2884, 1981.

6. Dietzmann, H.E., et al. "Analytical Procedures for Characterizing Unregulated, Pollutant Emissions from Motor Vehicles," Report EPA 600/2-79-017, February 1979.

7. Code of Federal Regulations, Title 40, Chapter 1, Part 85, Subpart H Section applicable to 1979 Model Year Light-Duty Vehicles.

8. Highway Fuel Economy Driving Schedule (Federal Register, Vol. 41, No. 100, May 21, 1976, Appendix I).

9. U.S. HEW "Registry of Toxic Effect of Chemical Substances," 1976 and 1978 Editions.

10. Proceedings of the 1968 American Conference of Governmental Industrial Hygienists as reported in the Fifth Edition of the "Matheson Gas Data Book."

APPENDICES

A - GENERAL INFORMATION
B - INDIVIDUAL TEST RESULT SUMMARY TABLES
C - FTP INDIVIDUAL SAMPLE RESULTS
D - COMPUTER PRINTOUTS OF THE TEST RESULTS
E - SHORT-TEST RESULTS
F - AVERAGE VALUES FOR FTP AND HFET RESULTS

APPENDIX A

GENERAL INFORMATION

A-1 - I/M Short Test Procedures
A-2 - Calculations for Unregulated Emissions
A-3 - Memorandum to SwRC Employees
A-4 - Tune-Up Check List

APPENDIX A-1. I/M SHORT TEST PROCEDURES

NOTE: All tests are to be run with the hood open and the cooling fan on.

1. Warm-up to normal operating condition

   If engine is cold - run UDDS
   If engine is warm - run 505

2. Run 50 MPH in Drive or 3rd gear (FTP Inertia and HP Setting)

   Minute 1 - check and adjust load
   Minute 2 - stabilize
   Minute 3 - measure HC and CO

3. Idle 6 minutes and then measure HC and CO in the 4-Mode Idle Test (30 seconds per mode)

   (a) Idle in Neutral
   (b) 2500 RPM in Neutral
   (c) Idle in Neutral
   (d) Idle in Drive (or with clutch in)

4. Run 30 MPH (3 minutes total) and set dynamometer at 9.0 actual HP with minimum inertia - Idle 6 minutes and then measure HC and CO in the loaded 2-Mode Test (30 seconds per mode)

   (a) 30 mph (Drive or 3rd Gear)
   (b) Idle in Neutral

5. Make a preliminary check of propane enrichment - Adjust propane flow rate until the engine speed peaks out (and starts to decrease)

   Run 30 mph for two minutes

   Idle in Neutral w/o propane for two minutes

   Record RPM in each of the following conditions (each mode should take about 30 seconds):

   a. PCV system in place w/o propane
   b. PCV system in place with propane
   c. PCV valve removed from grommet w/o propane
   d. PCV valve removed from grommet with propane
   e. PCV fresh air line opened prior to PCV filter w/o propane
   f. PCV fresh air line opened prior to PCV filter with propane

   NOTE: "a" and "b" will be repeated if initial checks show such to be worthwhile. Repeat the two minutes at 30 mph and at idle, and "a" through "f" in Drive, in cars with an automatic transmission.

APPENDIX A-2. CALCULATIONS FOR UNREGULATED EMISSIONS

This appendices documents the calculational methods used for the unregulated emissions. All values not defined (i.e., CVS FLOW, VOL, etc.) are obtained from the computer printouts for the regulated emissions. Example printout is included as Table 1.

A. Individual Hydrocarbons and N_2O

1. For FTP Evaluations only, convert 2-Bag UDDS to Equivalent 1-Bag UDDS

$$\text{PPM 12} = \frac{\text{PPM}_1 \times \text{CVS FLOW}_1 + \text{PPM}_2 \times \text{CVS FLOW}_2}{\text{CVS FLOW}_1 + \text{CVS FLOW}_2}$$

$$\text{PPM 34} = \frac{\text{PPM}_3 \times \text{CVS FLOW}_3 + \text{PPM}_4 \times \text{CVS FLOW}_4}{\text{CVS FLOW}_3 + \text{PPM FLOW}_4}$$

2. Convert PPM to $\mu g/m^3$:

$$\mu g/m^3 = 35.32 \times \text{DENSITY} \times \text{PPM}$$

Density, g/ft^3			
Methane CH_4	- 18.86	Propane C_3H_8	- 17.29
Ethylene C_2H_4	- 16.50	Propylene C_3H_6	- 16.50
Ethane C_2H_6	- 17.68	Benzene C_6H_6	- 15.33
Acetylene C_2H_2	- 15.33	Toluene C_7H_8	- 15.49
		N_2O	- 51.82
NH_3	- 20.05		

B. Calculation of mg/km

$$\text{mg/km} = [(\text{EXH} \times \text{SCF} - \text{BG} \times \text{DFC}) \times \text{VOL} \div \text{KM}] \div 1000$$

Calculations were performed using a Hewlett-Packard HP-65 Programmable Calculator

Dry (DFC) and (SFC) was used for all unregulated emissions except: IHC and N_2O

DFC and SFC are obtained from the computer print-out for regulated emissions. (See Talbes 1 and 2.)

C. Metals and Other Elements

COMPONENT WEIGHT ON FILTER = $\mu g/cm^2$ EFF. FILTER AREA

EFF. FILTER AREA = 14.3 cm^2

COMPONENT $\mu g/m^3$ = C.W.O.F. ÷ TOTAL WT. × ($\mu g/m^3$ for Total Wt.)

APPENDIX A-2 (Cont'd). CALCULATIONS FOR UNREGULATED EMISSIONS

D. Calculation of Oxygen

$$\text{Average} = \frac{\text{INTEGRATOR COUNTS}}{6.994 \times \text{SECONDS}} \times \text{FULL SCALE VALUE}$$

$$= \% \text{ for Oxygen}$$

E. Calculation for 4-FTP

$$\text{Composite 4-FTP} = 0.43 \times (\text{Value for 1\&2}) + 0.57 \times (\text{Value for 3\&4})$$

[illegible] CALCULATIONS FOR UNREGULATED EMISSIONS

TABLE 1. COMPUTER PRINTOUT NOMENCLATURE FOR FOUR-BAG FTP

```
                             FTP    VEHICLE EMISSIONS RESULTS
                                     PROJECT

TEST NO.            RUN              VEHICLE NO.                            TEST WEIGHT        KG(       LBS)
VEHICLE MODEL                        DATE                                   ACTUAL ROAD LOAD       KW(       HP)
ENGINE      L(      CID)             BAG CART NO.   / CVS NO.               DIESEL
TRANSMISSION                         DYNO NO.                               ODOMETER        KM(        MILES)

BAROMETER        MM HG(      IN HG)  DRY BULB TEMP.      DEG C(     DEG F)
RELATIVE HUMIDITY      PCT           ABS. HUMIDITY      GM/KG               NOX HUMIDITY CORRECTION FACTOR
BAG RESULTS
   BAG NUMBER                                1               2               3                4
   DESCRIPTION                        COLD TRANSIENT     STABILIZED     HOT TRANSIENT      STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)
   BLOWER INLET P MM. H2O(IN. H2O)
   BLOWER INLET TEMP. DEG. C(DEG. F)
   BLOWER REVOLUTIONS
   TOT FLOW STD. CU. METRES(SCF)
   HC  SAMPLE METER/RANGE/PPM
   HC  BCKGRD METER/RANGE/PPM
   CO  SAMPLE METER/RANGE/PPM
   CO  BCKGRD METER/RANGE/PPM
   CO2 SAMPLE METER/RANGE/PCT
   CO2 BCKGRD METER/RANGE/PCT
   NOX SAMPLE METER/RANGE/PPM
   NOX BCKGRD METER/RANGE/PPM
   DILUTION FACTOR
   HC  CONCENTRATION PPM
   CO  CONCENTRATION PPM
   CO2 CONCENTRATION PCT
   NOX CONCENTRATION PPM
   HC  MASS GRAMS
   CO  MASS GRAMS
   CO2 MASS GRAMS
   NOX MASS GRAMS
   PARTICULATE MASS GRAMS

   HC  GRAMS/KM
   CO  GRAMS/KM
   CO2 GRAMS/KM
   NOX GRAMS/KM
   FUEL CONSUMPTION BY CB L/100KM

   RUN TIME             SECONDS
   MEASURED DISTANCE    KM
   SCF, DRY
        DFC, WET (DRY)
        SCF, WET (DRY)
        VOL (SCM)
        SAM BLR (SCM)
        KM  (MEASURED)
        FUEL CONSUMPTION L/100KM

COMPOSITE RESULTS                                                                        3-BAG     (4-BAG)
   TEST NUMBER                                              CARBON DIOXIDE      G/KM               (      )
   BAROMETER     MM HG                                      FUEL CONSUMPTION    L/100KM            (      )
   HUMIDITY      G/KG                                       HYDROCARBONS (THC)  G/KM               (      )
   TEMPERATURE   DEG C                                      CARBON MONOXIDE     G/KM               (      )
                                                            OXIDES OF NITROGEN  G/KM               (      )
                                                            PARTICULATES        G/KM               (      )
```

APPENDIX A-2 (CONT'D). CALCULATION FOR UNREGULATED EMISSIONS

TABLE 2. DEFINITION OF COMPUTER PRINTOUT NOMENCLATURE

FOR FOUR-BAG AND SINGLE-BAG

REGULATED EMISSIONS

The following are primarily exerpts taken from the computer program:

AVG. EXH. OXYGEN: Direct printout of an input

CATALYST AVG. AND MAX. TEMPS.: Input converted to °C and printed-out

```
C   DFC = DILUTION FACTOR CORRECTION  DFC = FOR WET SAMPLES  DFCD = FOR DRY

    DF(J)=13.4/(  YC2(2,J) +(( YH(2,J) + CC(2,J))/10000.))
    DFC(J) = 1 - 1/DF(J)

C   CALCULATE DFC, VOL. KM FOR BAGS 1+2 AND 3+4
C   DF = TOTAL CVS FLOW / EXHAUST FLOW = AIR + EXH / EXH
C   DFC = 1 - 1/DF = 1 - EXH/(AIR+EXH) = AIR/(AIR+EXH)
    DFC12 =(DFC(1)*VMIX(1) + DFC(2)*VMIX(2)) / (VMIX(1) + VMIX(2))
    DFC34 = (DFC(3)*VMIX(3) + DFC(4)*VMIX(4)) / (VMIX(3) + VMIX(4))
    IF(RH.LT.20) RH = 20
    DFCD12 = DFC12 * (1.0 - 0.000323*(RH - 20))
    DFCD34 = DFC34 * (1.0 - 0.000323*(RH - 20))

C   SCF = SAMPLE CORRECTION FACTOR FOR WATER REMOVAL   SCF = FOR WET  SCFD=DRY
    SCF12 = 1.000
    SCF34 = 1.000
    SCFD12 = (SCFD(1)*VMIX(1)+SCFD(2)+VMIX(2)) / (VMIX(1) + VMIX(2))
    SCFD34 = (SCFD(3)*VMIX(3)+SCFD(4)*VMIX(4)) / (VMIX(3) + VMIX(4))
```

TOTAL FUEL SULFUR:

```
C   TFS = TOTAL FUEL SULFUR IN MG/KM
C   TFS = L/100KM * PCT  * G/ML * 1000ML/L * 0.01G/GPCT * 1000MG/G

    TFS = CBFM   * FSWPCT * FPPG * 100.

C   CALCULATE 4-BAG EMISSIONS AND FUEL CONSUMPTION
C   4-BAG = 0.43*(BAG1+BAG2)/(MILES1+MILES2)+0.57*(BAG3+BAG4)/(MILES3+MILES4)

    DISTA=MILES(1) + MILES(2)
    DISTB=MILES(2) + MILES(3)
    DISTC=MILES(3) + MILES(4)

    HCWM4 = 0.43*((HCM(1)+HCM(2)) / DISTA) + 0.57*((HCM(3)+HCM(4)) / DISTC)
    COWM4 = 0.43*((COM(1)+COM(2)) / DISTA) + 0.57*((COM(3)+COM(4)) / DISTC)
    CO2WM4= 0.43*((CO2M(1)+CO2M(2))/DISTA) + 0.57*((CO2M(3)+CO2M(4)) / DISTC)
    NOXWM4= 0.43*((NOXM(1)+NOXM(2))/DISTA) + 0.57*((NOXM(3)+NOXM(4)) / DISTC)
    CBFE4 = 2421. / (.866*HCWM4 + .429*COWM4 + .273*CO2WM4)
```

APPENDIX A-3
DEPARTMENT OF EMISSIONS RESEARCH

MEMORANDUM

TO: SwRI and SFRE Staff

SUBJECT: Exhaust emissions and fuel economy tests on employee-owned cars.

DATE: December 10, 1980

Do you own a 1978 or later model car that has been driven over 50,000 miles using only unleaded gasoline? If so, would you be willing to allow it to be used in an exhaust emission survey to be conducted at the Department of Emissions Research starting in January 1981? The test will require approximately five (5) days.

If you car is selected and used, you will be given $50.00 for the use of you car and will be furnished a car for transportation. In addition, you car will be tuned to factory specifications and the fuel tank will be filled upon its return to you. The emissions and fuel economy (mpg) results for your car will be furnished to you as soon as possible after testing has been completed.

If you are willing to participate, please fill in the form and return it to Orville Davis at Building 87. If you have any questions contact Orville Davis at extension 2661.

- -

Yes, I would like to participate in the exhaust emissions survey to be conducted at the Department of Emissions Research.

My car has ________actual miles on the odometer and, to the best of my knowledge, only unleaded fuel has been used.

Year________Make________________________Model__________________________

Name____________________________Dept.______Telephone extension_________

APPENDIX A-4. TUNE-UP CHECK LIST

ALL CARS

- All items listed on the Vehicle Emission Control Information sticker
- Check for air flow from air pump - Check if flow solenoids function
- Visual and shake test of PCV
- Air Cleaner and Spark Plug visual check
- EGR Actuation Test - Free to actuate and vacuum to
- Check for lead in tailpipe
- Visual appearance of Catalyst Exterior
- Choke setting and whether it fully opens
- Propane RPM Gain Check
- Fluid levels, oil leaks, manifold heat riser, battery charge, visual appearance of hoses and vacuum lines
- Road test by a knowledgeable driver

MERCURY MARQUIS

- EEC Diagnostic test by a local dealer

CARS OTHER THAN MARQUIS

- Ignition timing (including check of advance with speed and vacuum)
- Idle mixture adjustment, as necessary

CARS FAILING TO MEET ANY OF THE ABOVE

- Compression check
- Parts replacement as necessary

APPENDIX B

INDIVIDUAL TEST RESULT SUMMARY TABLES

TABLE B-1. SUMMARY OF EMISSION RESULTS CAR 01 - 1978 BUICK REGAL

	Emission Rate, mg/km (Except as Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	011	012		011	012	
Barometer, mm Hg	739.4	749.0		739.1	749.0	
Humidity, g/km	5.9	5.2		5.9	5.1	
Temperature, °C	21.1	21.1		21.1	22.8	
Total Fuel Sulfur, mg/km	22.73	22.69		15.78	15.47	
Avg. Exh. Oxygen, %	0.64	0.57		0.95	0.74	
Catalyst Avg. Temp., °C	--	--		--	--	
Catalyst Max. Temp., °C	--	--		--	--	
Carbon Dioxide, g/km	298.5	302.8		225.3	221.1	
Fuel Cons., ℓ/100 km	13.96	13.94		9.69	9.50	
Regulated Emissions						
Hydrocarbons, (THC), g/km	1.16	0.95		0.18	0.18	
Carbon Monoxide, g/km	15.83	13.27		0.72	0.62	
Oxides of Nitrogen, g/km	0.93	0.95		0.92	0.85	
Particulates						
Total Particulates	38.34	24.10		23.78	11.06	
Compound Group Totals						
Aldehydes & Ketones	6.4	14.5		2.1	8.0	
Individual Hydrocarbons	399.2	322.6		67.6	84.2	
Organic Sulfides	0.22	0.21		0.01	0.01	
Organic Amines	0.04	0.05		0.01	0.03	
Other Compounds						
Ammonia	10.32	2.30		2.47	2.41	
Cyanide & Cyanogen	1.62	2.35		0.96	0.90	
Hydrogen Sulfide	0.00	0.00		0.00	0.00	
Nitrous Oxide	29.02	23.78		7.24	12.31	

Note: No significant changes were made during the tune-up.

TABLE B-1 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 01 - BUICK REGAL

	Emission Rate, mg/km (Except at Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	011	012		011	012	
Aldehydes and Ketones						
Formaldehyde	5.88	11.77		2.05	5.40	
Acetaldehyde	0.54	2.70		0.00	1.85	
Acetone	0.00	0.00		0.00	0.75	
Isobutyraldehyde	--	--		--	--	
Methylethylketone	0.00	0.00		0.00	0.00	
Hexanaldehyde	0.00	0.00		0.00	0.00	
Aldehydes and Ketones	6.4	14.5		2.1	8.0	
Total as % of THC, %	0.6	1.5		1.2	4.4	
Individual Hydrocarbons						
Methane	74.23	62.39		24.39	22.57	
Ethylene	101.43	74.03		7.90	22.20	
Ethane	16.20	17.06		8.68	9.03	
Acetylene	20.78	16.62		0.00	1.04	
Propane	0.37	1.17		0.00	0.29	
Propylene	45.62	33.30		8.37	9.30	
Benzene	55.31	52.84		9.32	9.53	
Toluene	85.27	65.18		8.92	10.20	
Toluene Individual HC	399.2	322.6		67.6	84.2	
Total as % of THC, %	34.4	34.0		37.5	46.8	
Organic Sulfides						
Carbonyl Sulfide	0.14	0.15		0.00	0.00	
Methyl Sulfide	0.07	0.06		0.01	0.01	
Ethyl Sulfide	0.01	0.00		0.00	0.00	
Methyl Disulfide	0.00	0.00		0.00	0.00	
Organic Amines						
Monomethylamine	0.00	0.05		0.01	0.01	
Monoethylamine	0.03	0.00		0.00	0.02	
Trimethylamine	0.01	0.00		0.00	0.00	
Diethylamine	0.00	0.00		0.00	0.00	
Triethylamine	0.00	0.00		0.00	0.00	

TABLE B-1 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 01 - BUICK REGAL

		Emission Rate, mg/km					
		FTP			HFET		
		As-Received		After Tune-up	As-Received		After Tune-up
Test Number,	VVT	011	012		011	012	
Trace Elements							
Sodium	Na	0.01					
Sulfur	S	0.02	0.03		0.06	0.07	
Vanadium	V						
Nickel	Ni						
Cadmium	Cd						
Mecury	Hg						
Magnesium	Mg		0.01		0.01	0.01	
Chlorine	Cl	0.01	0.01		0.01	0.02	
Chromium	Cr						
Copper	Cu						
Tin	Sn						
Lead	Pb						
Aluminum	Al		0.02		0.01	0.01	
Potassium	K						
Manganese	Mn						
Zinc	Zn	0.02	0.01				
Antimony	Sb						
Silicon	Si	0.02	0.01		0.06	0.03	
Calcium	Ca	0.04	0.03		0.02	0.02	
Iron	Fe	0.05	0.19		0.05	0.08	
Selenium	Se						
Barium	Ba						
Phosphorus	P	0.01	0.02		0.01	0.01	
Titanium	Ti						
Cobalt	Co						
Bromine	Br						
Platinum	Pt						

TABLE B-2. SUMMARY OF EMISSION RESULTS CAR 02 - 1979 MERCURY MARQUIS

	Emission Rate, mg/km (Except as Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	021	022		021	022	
Barometer, mm Hg	155.1	753.9		755.4	754.1	
Humidity, g/km	3.7	3.5		4.1	3.4	
Temperature, °C	19.4	21.1		22.2	22.8	
Total Fuel Sulfur, mg/km	27.01	27.16		17.66	17.47	
Avg. Exh. Oxygen, %	5.10	5.35		4.62	4.67	
Catalyst Avg. Temp., °C	--	--		--	--	
Catalyst Max. Temp., °C	--	--		--	--	
Carbon Dioxide, g/km	381.8	384.2		253.3	250.3	
Fuel Cons., ℓ/100 km	16.59	16.68		10.85	10.73	
Regulated Emissions						
Hydrocarbons, (THC), g/km	0.44	0.42		0.16	0.15	
Carbon Monoxide, g/km	3.56	3.39		0.28	0.30	
Oxides of Nitrogen, g/km	1.42	1.44		1.22	1.32	
Particulates						
Total Particulates	20.19	13.31		27.67	49.05	
Compound Group Totals						
Aldehydes & Ketones	0.6	0.0		0.0	4.3	
Individual Hydrocarbons	175.1	159.0		67.4	61.2	
Organic Sulfides	0.63	0.26		0.08	0.00	
Organic Amines	0.00	0.00		0.00	0.00	
Other Compounds						
Ammonia	6.70	17.83		10.22	2.08	
Cyanide & Cyanogen	0.01	0.22		0.24	0.14	
Hydrogen Sulfide	0.00	0.00		0.00	0.00	
Nitrous Oxide	56.22	60.87		35.32	37.09	

TABLE B-2 (Cont'd). SUMMARY OF EMISSIONS RESULTS CAR 02 - 1979 MERCURY MARQUIS

	Emission Rate, mg/km (Except at Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	021	022		021	022	
Aldehydes and Ketones						
Formaldehyde	0.00	0.00		0.00	4.27	
Acetaldehyde	0.60	0.00		0.00	0.00	
Acetone	0.00	0.00		0.00	0.00	
Isobutyraldehyde	--	--		--	--	
Methylethylketone	0.00	0.00		0.00	0.00	
Hexanaldehyde	0.00	0.00		0.00	0.00	
Aldehydes and Ketones	0.6	0.00		0.00	4.3	
Total as % of THC, %	0.1	0.00		0.00	2.8	
Individual Hydrocarbons						
Methane	88.44	82.27		37.73	33.92	
Ethylene	27.72	23.43		11.68	10.26	
Ethane	15.85	14.62		10.19	9.51	
Acetylene	8.18	6.25		0.00	0.00	
Propane	1.07	0.63		0.53	0.49	
Propylene	5.85	5.44		1.69	1.65	
Benzene	11.13	11.04		3.26	2.94	
Toluene	16.87	15.31		2.36	2.47	
Toluene Individual HC	175.1	159.0		6.74	61.2	
Total as % of THC, %	39.8	37.9		42.2	40.8	
Organic Sulfides						
Carbonyl Sulfide	0.63	0.25		0.08	0.00	
Methyl Sulfide	0.00	0.01		0.00	0.00	
Ethyl Sulfide	0.00	0.00		0.00	0.00	
Methyl Disulfide	0.00	0.00		0.00	0.00	
Organic Amines						
Monomethylamine	0.00	0.00		0.00	0.00	
Monoethylamine	0.00	0.00		0.00	0.00	
Trimethylamine	0.00	0.00		0.00	0.00	
Diethylamine	0.00	0.00		0.00	0.00	
Triethylamine	0.00	0.00		0.00	0.00	

TABLE B-2 (Cont'd). SUMMARY OF EMISSIONS RESULTS CAR 02 - 1979 MERCURY MARQUIS

		Emission Rate, mg/km					
		FTP			HFET		
		As-Received		After Tune-up	As-Received		After Tune-up
Test Number,	VVT	021	022		021	022	
Trace Elements							
Sodium	Na						
Sulfur	S	0.32	0.41		2.18	4.41	
Vanadium	V						
Nickel	Ni						
Cadmium	Cd						
Mecury	Hg						
Magnesium	Mg						
Chlorine	Cl	0.01	0.01				
Chromium	Cr						
Copper	Cu						
Tin	Sn						
Lead	Pb						
Aluminum	Al	0.01	0.01		0.01	0.01	
Potassium	K						
Manganese	Mn						
Zinc	Zn						
Antimony	Sb						
Silicon	Si	0.13	0.08		0.02	0.04	
Calcium	Ca	0.02	0.02			0.01	
Iron	Fe	0.17	0.23		0.03	0.06	
Selenium	Se						
Barium	Ba						
Phosphorus	P						
Titanium	Ti						
Cobalt	Co						
Bromine	Br						
Platinum	Pt						

TABLE B-3. SUMMARY OF EMISSION RESULTS CAR 03 - 1979 MERCURY MARQUIS

	Emission Rate, mg/km (Except as Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	031	032	036	037	031	032	036	037
Barometer, mm Hg	737.9	731.0	760.2	756.7	736.6	756.9	761.0	755.9
Humidity, g/km	7.7	8.1	1.9	2.5	8.6	7.5	1.5	2.4
Temperature, °C	21.1	20.6	20.0	21.1	22.2	23.9	22.2	23.9
Total Fuel Sulfur, mg/km	28.34	27.82	26.80	26.93	17.94	18.17	17.60	17.18
Avg. Exh. Oxygen, %	4.59	4.30	5.39	5.19	4.25	4.15	4.93	4.95
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	400.7	393.4	381.4	381.7	255.8	257.9	252.3	246.1
Fuel Cons., ℓ/100 km	17.41	17.09	16.46	16.54	11.02	11.16	10.81	10.55
Regulated Emissions								
Hydrocarbons, (THC), g/km	0.45	0.38	0.42	0.41	0.15	0.18	0.12	0.10
Carbon Monoxide, g/km	3.66	3.70	1.90	2.92	1.27	1.91	0.36	0.44
Oxides of Nitrogen, g/km	0.98	1.08	1.06	1.07	1.49	1.62	1.45	1.41
Particulates								
Total Particulates	27.48	19.93	17.45	14.23	25.24	17.77	8.07	14.05
Compound Group Totals								
Aldehydes & Ketones	--	3.9	0.9	2.7	--	0.0	3.3	3.2
Individual Hydrocarbons	155.8	171.0	168.9	185.4	59.8	73.7	52.7	52.7
Organic Sulfides	0.95	0.15	0.12	0.11	0.25	0.06	0.13	0.02
Organic Amines	0.03	0.03	0.01	0.00	0.00	0.00	0.00	0.00
Other Compounds								
Ammonia	1.45	--	5.41	1.33	1.00	5.62	4.01	2.82
Cyanide & Cyanogen	0.08	0.06	0.16	0.48	0.66	0.10	0.00	0.05
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	52.46	54.36	46.19	52.01	57.52	77.71	63.38	58.69

TABLE B-3 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 03 - 1979 MERCURY MARQUIS

	Emission Rate, mg/km (Except at Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	031	032	036	037	031	032	036	037
Aldehydes and Ketones								
Formaldehyde	--	2.88	0.94	0.93	--	0.00	3.25	3.22
Acetaldehyde	--	1.03	0.00	0.00	--	0.00	0.00	0.00
Acetone	--	0.00	0.00	0.00	--	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--
Methylethylketone	--	0.00	0.00	0.00	--	0.00	0.00	0.00
Hexanaldehyde	--	0.00	0.00	0.00	--	0.00	0.00	0.00
Aldehydes and Ketones	--	3.9	0.9	0.9	--	0.0	3.3	3.2
Total as % of THC, %	--	1.0	0.2	6.2	--	0.0	2.8	3.2
Individual Hydrocarbons								
Methane	76.72	97.43	95.04	106.65	33.10	37.07	36.92	38.63
Ethylene	15.57	16.55	15.84	16.19	7.26	11.17	3.53	3.01
Ethane	11.06	14.21	14.99	13.72	8.67	8.66	7.92	7.29
Acetylene	9.13	5.13	4.05	6.50	0.00	0.00	0.00	0.00
Propane	0.16	0.14	2.05	0.28	0.00	0.00	0.00	0.00
Propylene	4.34	3.98	4.11	4.29	1.38	2.61	0.00	0.00
Benzene	14.18	12.27	9.64	13.33	4.20	5.90	2.10	1.98
Toluene	24.60	21.25	23.18	24.46	5.15	8.26	2.20	1.76
Toluene Individual HC	155.8	171.0	168.9	185.4	59.8	73.7	52.7	52.7
Total as % of THC, %	34.6	45.0	40.2	45.2	39.9	40.9	43.9	52.7
Organic Sulfides								
Carbonyl Sulfide	0.85	0.15	0.12	0.07	0.21	0.05	0.11	0.01
Methyl Sulfide	0.10	0.00	0.00	0.04	0.04	0.01	0.02	0.01
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines								
Monomethylamine	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-3 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 03 - 1979 MERCURY MARQUIS

		Emission Rate, mg/km							
		FTP				HFET			
		As-Received		After Tune-up		As-Received		After Tune-up	
Test Number,	VVT	031	032	036	037	031	032	036	037
Trace Elements									
Sodium	Na								
Sulfur	S	0.11	0.12	0.20	0.20	0.20	0.35	0.93	0.85
Vanadium	V								
Nickel	Ni								
Cadmium	Cd								
Mecury	Hg								
Magnesium	Mg			0.01					
Chlorine	Cl	0.04	0.03	0.01		0.01	0.01		
Chromium	Cr								
Copper	Cu								
Tin	Sn								
Lead	Pb								
Aluminum	Al	0.02	0.03	0.18	0.04	0.01		0.01	
Potassium	K								
Manganese	Mn			0.02					
Zinc	Zn								
Antimony	Sb								
Silicon	Si	0.19	0.12	0.08	0.11	0.12	0.01	0.01	0.02
Calcium	Ca	0.02	0.02	0.04	0.03	0.03	0.01		0.01
Iron	Fe	0.50	0.49	1.42	0.47	0.17	0.04	0.10	0.03
Selenium	Se								
Barium	Ba								
Phosphorus	P	0.01	0.01	0.02	0.02				
Titanium	Ti		0.03				0.03		
Cobalt	Co								
Bromine	Br	0.21	0.12	0.08		0.12			
Platinum	Pt								

TABLE B-4. SUMMARY OF EMISSION RESULTS CAR 04 - 1978 FORD GRANADA

	Emission Rate, mg/km (Except as Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	041	042	046	041	042	046
Barometer, mm Hg	743.5	741.4	742.2	743.5	741.7	742.2
Humidity, g/km	7.4	10.7	11.4	8.2	11.2	12.2
Temperature, °C	27.8	23.3	25.0	24.4	28.9	26.7
Total Fuel Sulfur, mg/km	30.69	30.13	29.83	20.09	20.11	20.12
Avg. Exh. Oxygen, %	--	--	8.06	--	--	8.44
Catalyst Avg. Temp., °C	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--
Carbon Dioxide, g/km	427.3	419.2	416.8	284.5	282.8	284.8
Fuel Cons., ℓ/100 km	18.85	18.51	18.32	12.34	12.35	12.36
Regulated Emissions						
Hydrocarbons, (THC), g/km	1.08	1.08	1.12	0.49	0.59	0.65
Carbon Monoxide, g/km	7.04	6.99	5.61	1.99	2.95	1.79
Oxides of Nitrogen, g/km	0.61	0.62	0.67	0.66	0.70	0.77
Particulates						
Total Particulates	34.95	37.38	44.31	34.25	25.58	27.95
Compound Group Totals						
Aldehydes & Ketones	8.5	4.5	9.1	5.9	3.6	4.8
Individual Hydrocarbons	433.2	409.2	431.6	218.5	258.3	251.3
Organic Sulfides	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds						
Ammonia	9.24	0.87	3.38	3.46	1.76	3.91
Cyanide & Cyanogen	0.56	0.70	0.98	0.22	1.31	0.99
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	6.82	7.74	6.10	8.13	8.37	8.43

TABLE B-4 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 04 - 1978 FORD GRANADA

	Emission Rate, mg/km (Except at Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	041	042	046	041	042	046
Aldehydes and Ketones						
Formaldehyde	6.25	4.50	7.37	3.86	3.31	4.53
Acetaldehyde	2.27	0.00	1.68	2.04	0.24	0.25
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methylethylketone	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	8.5	4.5	9.1	5.9	3.6	4.8
Total as % of THC, %	0.8	0.4	0.8	1.2	0.6	0.7
Individual Hydrocarbons						
Methane	135.76	131.64	121.63	70.26	82.03	76.32
Ethylene	83.57	82.29	85.20	47.25	53.79	51.61
Ethane	42.47	43.04	42.30	26.47	26.24	25.91
Acetylene	21.74	15.12	45.56	5.17	13.31	9.09
Propane	2.86	2.23	0.95	1.45	1.19	0.44
Propylene	29.54	29.95	28.27	17.34	19.16	17.73
Benzene	39.47	35.10	33.34	18.19	22.91	22.48
Toluene	77.77	69.85	74.39	32.33	39.63	47.70
Toluene Individual HC	433.2	409.2	431.6	218.5	258.3	251.3
Total as % of THC, %	40.1	37.9	38.5	44.6	43.8	38.7
Organic Sulfides						
Carbonyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-4 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 04 - 1978 FORD GRANADA

		Emission Rate, mg/km			
		FTP		HFET	
		As-Received	After Tune-up	As-Received	After Tune-up
Test Number,	VVT	041	046	041	046
Trace Elements					
Sodium	Na		0.01		
Sulfur	S	0.07	0.13	0.09	0.16
Vanadium	V				
Nickel	Ni				
Cadmium	Cd				
Mecury	Hg				
Magnesium	Mg		0.02	0.01	0.01
Chlorine	Cl	0.02	0.01	0.02	0.01
Chromium	Cr				
Copper	Cu				
Tin	Sn				
Lead	Pb				
Aluminum	Al	0.01	0.01	0.01	
Potassium	K				
Manganese	Mn				
Zinc	Zn	0.02	0.07		0.04
Antimony	Sb				
Silicon	Si	0.92	0.16	1.17	0.79
Calcium	Ca	0.06	0.04	0.05	0.03
Iron	Fe	0.54	0.43	0.31	0.29
Selenium	Se				
Barium	Ba				
Phosphorus	P	0.02	0.05	0.01	0.03
Titanium	Ti			0.03	0.01
Cobalt	Co				
Bromine	Br	0.12	0.13		0.11
Platinum	Pt				

TABLE B-5. SUMMARY OF EMISSION RESULTS CAR 05 - 1978 VOLVO 245DL

	Emission Rate, mg/km (Except as Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	051	052	056	057	051	052	058	057
Barometer, mm Hg	741.7	735.6	731.8	740.9	741.9	734.6	740.9	741.3
Humidity, g/km	9.1	11.5	9.7	6.0	10.0	11.8	8.9	7.3
Temperature, °C	23.9	23.3	26.1	25.0	25.0	26.1	24.4	25.0
Total Fuel Sulfur, mg/km	21.46	21.54	20.20	20.42	12.88	12.58	12.86	12.55
Avg. Exh. Oxygen, %	0.51	0.47	1.35	0.50	0.19	0.14	0.16	0.17
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	301.6	303.2	283.6	288.1	181.5	178.6	182.9	177.7
Fuel Cons., ℓ/100 km	13.18	13.23	12.41	12.54	7.91	7.73	7.90	7.71
Regulated Emissions								
Hydrocarbons, (THC), g/km	0.38	0.38	0.42	0.34	0.25	0.22	0.23	0.24
Carbon Monoxide, g/km	3.77	3.59	3.69	2.98	1.88	1.19	1.00	1.34
Oxides of Nitrogen, g/km	0.49	0.51	0.52	0.57	0.34	0.24	0.28	0.32
Particulates								
Total Particulates	6.63	10.12	--	2.02	--	2.14	3.34	2.12
Compound Group Totals								
Aldehydes & Ketones	3.9	1.3	1.1	1.5	1.0	0.3	0.3	0.0
Individual Hydrocarbons	207.8	194.0	204.7	160.9	134.2	113.7	122.4	124.8
Organic Sulfides	0.17	0.05	0.06	0.02	0.02	0.01	0.03	0.05
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds								
Ammonia	18.25	19.82	28.00	34.98	2.66	10.34	20.71	20.95
Cyanide & Cyanogen	0.59	0.85	0.98	0.71	0.43	0.62	0.46	0.43
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	97.45	114.77	128.34	116.98	95.93	87.13	116.75	115.95

TABLE B-5 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 05 - 1978 VOLVO 245DL

	Emission Rate, mg/km (Except at Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	051	052	056	057	051	052	056	057
Aldehydes and Ketones								
Formaldehyde	3.26	0.24	0.36	0.46	1.00	0.00	0.04	0.00
Acetaldehyde	0.62	1.07	0.54	1.10	0.00	0.34	0.25	0.00
Acetone	--	--	--	0.00	--	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--
Methylethylketone	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	3.9	1.3	1.1	1.5	1.0	0.3	0.3	0.0
Total as % of THC, %	1.0	0.3	0.3	0.4	0.4	0.1	0.1	0.0
Individual Hydrocarbons								
Methane	55.01	54.21	53.83	50.90	28.22	26.76	28.12	27.37
Ethylene	44.91	39.88	42.00	28.77	35.09	27.80	29.93	31.21
Ethane	13.28	12.40	12.82	11.52	8.61	7.79	8.90	8.40
Acetylene	4.18	3.41	2.45	3.42	0.00	0.00	0.00	0.00
Propane	1.15	0.88	0.89	0.27	0.00	0.27	0.30	0.43
Propylene	18.20	17.68	18.22	12.41	18.00	14.21	16.05	16.92
Benzene	31.01	30.08	28.98	23.45	17.90	16.24	16.12	16.06
Toluene	40.09	35.46	45.49	30.17	26.36	20.61	22.98	24.36
Toluene Individual HC	207.8	194.0	204.7	160.9	134.2	113.7	122.4	124.8
Total as % of THC, %	54.7	51.1	48.7	47.3	53.7	51.7	53.2	52.0
Organic Sulfides								
Carbonyl Sulfide	0.13	0.05	0.05	0.02	0.01	0.00	0.02	0.04
Methyl Sulfide	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01
Ethyl Sulfide	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines								
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-5 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 05 - 1978 VOLVO 245DL

		Emission Rate, mg/km							
		FTP				HFET			
		As-Received		After Tune-up		As-Received		After Tune-up	
Test Number,	VVT	051	052	056	057	051	052	056	057
Trace Elements									
Sodium	Na								
Sulfur	S	0.06	0.04	0.04	0.04	0.02	0.02	0.04	0.02
Vanadium	V								
Nickel	Ni								
Cadmium	Cd								
Mecury	Hg								
Magnesium	Mg	0.01	0.01	0.01	0.01			0.01	0.01
Chlorine	Cl	0.05	0.04	0.01	0.01	0.01	0.01	0.20	0.01
Chromium	Cr			0.03					
Copper	Cu								
Tin	Sn								
Lead	Pb								
Aluminum	Al	0.02	0.01						
Potassium	K								
Manganese	Mn								
Zinc	Zn								
Antimony	Sb								
Silicon	Si	0.03	0.04	0.01	0.02			0.01	
Calcium	Ca	0.10	0.13	0.07	0.10	0.02	0.01	0.08	0.03
Iron	Fe	0.66	0.33	0.15	0.26	0.08	0.08	0.25	0.08
Selenium	Se								
Barium	Ba								
Phosphorus	P	0.02	0.02	0.01	0.02	0.01		0.01	0.01
Titanium	Ti							0.01	
Cobalt	Co								
Bromine	Br	0.20	0.22	0.19	0.20	0.09	0.12	0.22	0.10
Platinum	Pt								

TABLE B-6. SUMMARY OF EMISSION RESULTS CAR 06 - 1978 OLDSMOBILE CUTLASS

	Emission Rate, mg/km (Except as Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	061	062	066	068	061	062	066	067
Barometer, mm Hg	752.1	751.3	749.8	746.8	752.3	751.3	750.1	746.8
Humidity, g/km	6.1	6.6	8.1	7.2	7.5	6.5	7.8	7.7
Temperature, °C	24.4	23.3	24.4	25.0	25.6	25.0	25.0	23.9
Total Fuel Sulfur, mg/km	20.33	20.11	21.18	20.40	14.41	14.60	15.11	14.98
Avg. Exh. Oxygen, %	0.98	--	1.27	1.38	0.87	--	0.82	0.76
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	276.2	273.7	289.8	278.7	205.6	208.4	215.7	213.6
Fuel Cons., ℓ/100 km	12.49	12.35	13.01	12.53	8.85	8.97	9.28	9.20
Regulated Emissions								
Hydrocarbons, (THC), g/km	0.56	0.52	0.42	0.53	0.12	0.11	0.10	0.10
Carbon Monoxide, g/km	9.37	8.85	8.68	8.36	0.83	0.89	0.92	0.95
Oxides of Nitrogen, g/km	2.08	2.23	0.69	0.67	2.88	2.97	0.70	0.66
Particulates								
Total Particulates	18.33	20.22	12.78	22.63	11.74	11.70	11.12	12.76
Compound Group Totals								
Aldehydes & Ketones	3.1	4.0	3.8	1.3	1.6	0.5	1.6	0.4
Individual Hydrocarbons	262.7	212.9	218.5	234.0	54.8	56.7	56.6	49.1
Organic Sulfides	0.06	0.04	0.06	0.02	0.04	0.01	0.02	0.01
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds								
Ammonia	16.43	10.59	9.26	4.33	6.27	14.12	4.07	2.73
Cyanide & Cyanogen	6.08	5.45	2.04	1.93	2.41	1.83	0.06	0.72
Hydrogen Sulfide	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
Nitrous Oxide	138.27	151.75	49.86	35.52	87.63	95.69	27.91	21.35

TABLE B-6 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 06 - 1978 OLDSMOBILE CUTLASS

	Emission Rate, mg/km (Except at Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	061	062	066	068	061	062	066	067
Aldehydes and Ketones								
Formaldehyde	0.94	1.32	1.70	0.74	0.19	0.00	0.75	0.44
Acetaldehyde	1.92	2.36	1.84	0.57	0.88	0.51	0.81	0.00
Acetone	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--
Methylethylketone	0.22	0.27	0.21	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	3.1	4.0	3.8	1.3	1.6	0.5	1.6	0.4
Total as % of THC, %	0.6	0.8	0.9	0.2	1.3	0.5	1.6	0.4
Individual Hydrocarbons								
Methane	56.66	51.75	59.73	51.68	21.84	23.80	25.30	19.51
Ethylene	59.74	30.50	44.38	43.92	10.56	10.68	10.82	8.74
Ethane	13.31	6.06	12.88	11.23	5.08	4.67	5.28	4.57
Acetylene	12.37	17.78	14.46	20.87	0.00	0.00	0.00	0.00
Propane	0.28	0.46	2.83	0.82	0.00	0.00	1.25	0.25
Propylene	26.20	19.31	16.83	17.47	3.65	3.77	2.66	2.98
Benzene	33.96	30.12	26.00	28.64	5.37	5.39	5.42	5.04
Toluene	60.17	56.91	41.39	59.34	8.34	8.36	5.83	8.01
Toluene Individual HC	262.7	212.9	218.5	234.0	54.8	56.7	56.6	49.1
Total as % of THC, %	46.9	40.9	52.0	44.2	45.7	51.6	56.6	49.1
Organic Sulfides								
Carbonyl Sulfide	0.06	0.03	0.03	0.01	0.04	0.01	0.01	0.01
Methyl Sulfide	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00
Ethyl Sulfide	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines								
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-6 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 06 - 1978 OLDSMOBILE CUTLASS

		Emission Rate, mg/km							
		FTP				HFET			
		As-Received		After Tune-up		As-Received		After Tune-up	
Test Number,	VVT	061	062	068	067	061	062	066	067
Trace Elements									
Sodium	Na								
Sulfur	S	0.04	0.04	0.04	0.04	0.02	0.02	0.03	0.03
Vanadium	V	0.01							
Nickel	Ni								
Cadmium	Cd								
Mecury	Hg								
Magnesium	Mg	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
Chlorine	Cl				0.01			0.01	0.19
Chromium	Cr								
Copper	Cu								
Tin	Sn								
Lead	Pb								
Aluminum	Al	0.03	0.03	0.03	0.03	0.01			
Potassium	K								
Manganese	Mn	0.05	0.02						
Zinc	Zn	0.02		0.02	0.01				
Antimony	Sb								
Silicon	Si	0.01	0.01		0.05	0.01		0.01	0.02
Calcium	Ca	0.06	0.02	0.04	0.30	0.03			
Iron	Fe	0.23	0.51	0.21	0.18	0.07	0.18	0.11	0.10
Selenium	Se								
Barium	Ba								
Phosphorus	P	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01
Titanium	Ti								
Cobalt	Co								
Bromine	Br	0.07	0.10		0.13		0.10	0.12	0.29
Platinum	Pt								

TABLE B-7. SUMMARY OF EMISSION RESULTS CAR 07 - 1978 CHEVROLET MALIBU, CALIFORNIA

	Emission Rate, mg/km (Except as Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	071	072	076	078	071	072	076	078
Barometer, mm Hg	747.3	736.9	747.8	742.7	747.5	737.1	747.3	741.9
Humidity, g/km	6.2	5.0	2.4	10.0	5.7	5.1	3.5	10.4
Temperature, °C	24.4	23.3	22.8	25.0	25.6	24.4	26.7	27.2
Total Fuel Sulfur, mg/km	27.29	27.50	26.54	26.41	17.58	16.93	17.79	17.71
Avg. Exh. Oxygen, %	--	4.18	4.77	5.48	--	4.98	4.97	5.01
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	379.0	381.1	370.0	365.7	250.5	240.9	253.9	251.3
Fuel Cons., ℓ/100 km	16.76	16.89	16.30	16.22	10.80	10.40	10.93	10.88
Regulated Emissions								
Hydrocarbons, (THC), g/km	0.38	0.42	0.40	0.42	0.10	0.12	0.10	0.16
Carbon Monoxide, g/km	7.95	8.48	6.83	8.30	1.38	1.52	1.15	2.05
Oxides of Nitrogen, g/km	0.44	0.46	0.43	0.45	0.38	0.36	0.32	0.40
Particulates								
Total Particulates	27.23	34.34	32.92	43.15	17.94	22.93	20.54	29.33
Compound Group Totals								
Aldehydes & Ketones	9.2	6.2	--	8.5	5.7	4.9	7.3	8.0
Individual Hydrocarbons	224.7	243.9	220.3	210.1	64.3	68.0	63.7	83.3
Organic Sulfides	0.12	0.03	0.05	0.03	0.10	0.04	0.01	0.02
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds								
Ammonia	3.17	2.10	14.51	10.85	2.63	6.44	1.70	5.88
Cyanide & Cyanogen	0.63	0.77	0.06	0.47	0.09	0.35	0.13	0.21
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	2.83	1.94	4.50	2.40	2.63	1.93	2.78	2.20

TABLE B-7 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 07 - 1978 CHEVROLET MALIBU, CALIFORNIA

	Emission Rate, mg/km (Except at Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	071	072	076	078	071	072	076	078
Aldehydes and Ketones								
Formaldehyde	6.49	6.23	--	7.68	4.25	4.89	6.09	7.13
Acetaldehyde	2.66	0.00	--	0.84	1.49	0.00	1.25	0.82
Acetone	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--
Methylethylketone	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	9.2	6.2	--	8.5	5.7	4.9	7.3	8.0
Total as % of THC, %	2.4	1.5	--	2.0	5.7	4.1	7.3	5.0
Individual Hydrocarbons								
Methane	88.14	90.39	77.74	62.92	19.54	19.28	19.24	22.72
Ethylene	46.82	50.08	50.27	54.43	22.79	25.25	22.55	29.79
Ethane	12.18	12.11	11.46	9.39	3.81	3.80	3.23	3.33
Acetylene	8.98	8.33	8.42	6.99	1.44	0.00	1.52	1.81
Propane	0.88	0.27	0.00	0.25	0.00	0.00	0.00	0.00
Propylene	15.78	17.15	16.07	16.89	5.20	5.78	4.69	6.83
Benzene	19.21	23.13	20.37	21.52	5.93	6.21	5.49	8.16
Toluene	32.72	42.40	35.94	37.75	5.61	7.72	7.00	10.61
Toluene Individual HC	224.7	243.9	220.3	210.1	64.3	68.0	63.7	83.3
Total as % of THC, %	59.1	58.1	55.1	50.0	64.3	56.7	63.7	52.1
Organic Sulfides								
Carbonyl Sulfide	0.08	0.01	0.01	0.03	0.07	0.03	0.00	0.01
Methyl Sulfide	0.01	0.01	0.01	0.00	0.03	0.01	0.00	0.01
Ethyl Sulfide	0.02	0.01	0.02	0.00	0.00	0.00	0.01	0.00
Methyl Disulfide	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Organic Amines								
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-7 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 07 - 1978 CHEVROLET MALIBU, CALIFORNIA

		EMISSION RATE, MG/KM							
		FTP				HFET			
		As Received		After Tune-up		As Received		After Tune-up	
Test Number, VVT		071	072	076	078	071	072	076	078
Trace Elements									
Sodium	Na		0.06						
Sulfur	S	0.07	0.12	0.11	0.08	0.14	0.20	0.69	0.37
Vanadium	V	0.01							
Cadmium	Cd								
Magnesium	Mg	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Chlorine	Cl	0.01	0.02		0.01	0.01	0.01		0.01
Chromium	Cr								
Copper	Cu	0.01							
Tin	Sn								
Lead	Pb								
Aluminum	Al	0.02	0.03	0.02	0.01	0.01	0.01	0.01	
Potassium	K		0.03		0.01				
Manganese	Mn								
Zinc	Zn	0.02	0.03	0.01		0.02			
Antimony	Sb								
Silicon	Si	0.02	0.15	0.01	0.01		0.01	0.05	
Calcium	Ca	0.11	0.32	0.08	0.07	0.04	0.06	0.04	0.03
Iron	Fe	0.27	0.37	0.08	0.11	0.09	0.03		0.03
Barium	Ba								
Phosphorus	P	0.01	0.03	0.01	0.01	0.01	0.01		0.01
Titanium	Ti		0.02						
Bronine	Br								
Arsenic	As	0.02	0.04						
Molybdenum	Mo	0.29	0.25	0.31	0.24	0.25	0.28	0.15	
Tungsten	W					0.07			
Strontium	Sr	0.18	0.14	0.21	0.17	0.17	0.16	0.07	

Note: Nickel, mercury, selenium, cobalt and platinum were analyzed for, but not detected.

TABLE B-8. SUMMARY OF EMISSION RESULTS CAR 08 - 1978 MONTE CARLO

	Emission Rate, mg/km (Except as Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	081	082	086	087	081	082	086	087
Barometer, mm Hg	748.5	741.7	745.2	740.2	747.8	743.7	745.2	739.9
Humidity, g/km	5.1	8.4	10.6	12.2	5.7	9.2	11.4	12.2
Temperature, °C	25.6	25.6	25.0	25.0	25.6	26.7	26.7	25.0
Total Fuel Sulfur, mg/km	20.64	20.95	20.55	20.48	13.32	14.07	13.90	13.94
Avg. Exh. Oxygen, %	2.86	2.99	1.35	--	2.57	2.59	0.85	--
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	291.6	295.7	280.0	278.5	191.2	194.2	197.4	198.1
Fuel Cons., ℓ/100 km	12.68	12.87	12.62	12.58	8.18	8.64	8.54	8.56
Regulated Emissions								
Hydrocarbons, (THC), g/km	0.27	0.28	0.49	0.55	0.07	0.06	0.15	0.12
Carbon Monoxide, g/km	3.00	3.14	9.01	9.18	0.12	0.20	1.40	1.31
Oxides of Nitrogen, g/km	2.00	2.18	0.70	0.72	2.35	2.78	0.79	0.78
Particulates								
Total Particulates	17.87	21.93	37.36	37.95	9.64	14.93	18.31	14.26
Compound Group Totals								
Aldehydes & Ketones	5.2	5.4	3.1	0.1	2.3	4.2	0.4	0.8
Individual Hydrocarbons	101.0	112.8	231.8	247.8	20.2	23.7	64.3	60.3
Organic Sulfides	0.08	0.04	0.10	0.04	0.03	0.01	0.02	0.00
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds								
Ammonia	2.73	10.74	3.44	4.42	2.77	3.69	3.91	3.53
Cyanide & Cyanogen	1.35	1.09	1.97	2.21	0.34	0.06	0.40	0.47
Hydrogen Sulfide	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Nitrous Oxide	43.39	34.32	30.66	32.89	19.79	17.96	26.68	29.56

TABLE B-8 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 08 - 1978 MONTE CARLO

	Emission Rate, mg/km (Except at Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	081	082	086	087	081	082	086	087
Aldehydes and Ketones								
Formaldehyde	5.24	5.38	2.45	0.09	1.36	3.27	0.36	0.84
Acetaldehyde	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--
Methylethylketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.92	0.92	0.00	0.00
Aldehydes and Ketones	5.2	5.4	3.1	0.1	2.3	4.2	0.4	0.8
Total as % of THC, %	1.9	1.9	0.6	0.0	3.3	7.0	0.3	0.7
Individual Hydrocarbons								
Methane	18.70	23.99	50.01	53122	6.83	7.85	20.63	21.72
Ethylene	23.07	26.12	49.43	50.30	5.78	6.20	14.27	11.56
Ethane	6.35	6.70	13.06	13.51	2.22	2.21	5.29	5.68
Acetylene	5.82	6.02	14.02	16.71	0.00	0.00	0.00	0.00
Propane	0.00	0.27	0.87	0.27	0.00	0.00	0.00	0.00
Propylene	9.28	10.14	21.15	22.79	0.00	0.00	5.67	4.77
Benzene	10.81	11.60	30.83	29.75	1.84	2.30	6.97	6.87
Toluene	27.01	27.91	52.39	61.25	3.53	5.10	11.46	9.68
Toluene Individual HC	101.0	112.8	231.8	247.8	20.2	23.7	64.3	60.3
Total as % of THC, %	37.4	40.3	47.3	45.1	28.9	39.5	42.9	50.3
Organic Sulfides								
Carbonyl Sulfide	0.02	0.02	0.04	0.02	0.03	0.01	0.02	0.00
Methyl Sulfide	0.01	0.02	0.05	0.01	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.05	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines								
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-8 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 08 - 1978 MONTE CARLO

		EMISSION RATE, MG/KM							
		FTP				HFET			
		As Received		After Tune-up		As Received		After Tune-up	
Test Number, VVT		081	082	086	087	081	082	086	087
Trace Elements									
Sodium	Na								
Sulfur	S	0.07	0.04	0.02	0.03	0.08	0.31	0.05	0.03
Vanadium	V			0.01					0.01
Cadmium	Cd							0.04	
Magnesium	Mg	0.01	0.01		0.01	0.01		0.01	0.01
Chlorine	Cl	0.01	0.01	0.01	0.01	0.0.		0.01	
Chromium	Cr								
Copper	Cu	0.01		0.01					0.02
Tin	Sn								
Lead	Pb								
Aluminum	Al	0.05	0.02	0.01	0.02	0.02	0.01	0.01	0.01
Potassium	K					0.06			
Manganese	Mn							0.02	
Zinc	Zn	0.02			0.01			0.02	
Antimony	Sb								
Silicon	Si	0.02	0.02	0.01	0.01	0.01		0.01	
Calcium	Ca	0.06	0.05	0.03	0.06	0.12	0.02	0.04	0.03
Iron	Fe	0.82	0.16	0.08	0.10	0.23	0.05	0.11	0.03
Barium	Ba								0.01
Phosphorus	P	0.01				0.01		0.01	
Titanium	Ti					0.01		0.01	
Bronine	Br								
Arsenic	As	0.02							
Molybdenum	Mo	0.15	0.18	0.18	0.27	0.11			0.29
Tungsten	W	0.04			0.05				0.06
Strontium	Sr	0.12	0.12	0.14	0.13	0.06		0.07	0.17

Note: Nickel, mercury, selenium, cobalt and platinum were analyzed for, but not detected

TABLE B-9. SUMMARY OF EMISSION RESULTS CAR 09 - 1978 FORD FIESTA

	Emission Rate, mg/km (Except as Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	091	092	096	091	092	096
Barometer, mm Hg	738.1	745.5	734.1	739.1	745.5	733.6
Humidity, g/km	12.7	9.9	13.6	12.2	10.2	12.6
Temperature, °C	23.9	25.0	23.9	25.0	24.4	26.1
Total Fuel Sulfur, mg/km	12.60	12.57	12.39	8.37	8.38	8.17
Avg. Exh. Oxygen, %	7.54	7.44	7.43	6.78	7.00	7.07
Catalyst Avg. Temp., °C	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--
Carbon Dioxide, g/km	177.7	177.0	175.1	119.9	120.0	117.2
Fuel Cons., ℓ/100 km	7.74	7.72	7.61	5.14	5.15	5.02
Regulated Emissions						
Hydrocarbons, (THC), g/km	0.38	0.41	0.34	0.14	0.14	0.10
Carbon Monoxide, g/km	1.57	1.62	1.38	0.09	0.12	0.08
Oxides of Nitrogen, g/km	1.91	1.81	1.80	2.06	2.09	1.77
Particulates						
Total Particulates	38.78	31.39	33.42	25.19	33.72	19.86
Compound Group Totals						
Aldehydes & Ketones	0.0	3.4	1.3	0.0	1.8	2.4
Individual Hydrocarbons	92.4	106.6	104.9	29.7	31.0	--
Organic Sulfides	0.03	0.02	0.01	0.00	0.00	0.00
Organic Amines	0.00	0.00	0.00	0.00	0.00	0.00
Other Compounds						
Ammonia	2.72	2.14	2.19	0.77	1.97	2.49
Cyanide & Cyanogen	0.24	0.17	0.35	0.29	0.21	0.31
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Nitrous Oxide	8.08	10.69	6.54	5.38	8.18	5.64

TABLE B-9 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 09 - 1978 FORD FIESTA

	Emission Rate, mg/km (Except at Noted)					
	FTP			HFET		
	As-Received		After Tune-up	As-Received		After Tune-up
Test Number, VVT	091	092	096	091	092	096
Aldehydes and Ketones						
Formaldehyde	0.00	3.39	1.34	0.00	1.80	2.45
Acetaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methylethylketone	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	0.0	3.4	1.3	0.0	1.8	2.4
Total as % of THC, %	0.0	0.8	0.4	0.0	1.3	2.4
Individual Hydrocarbons						
Methane	22.69	26.43	32.90	7.15	5.18	--
Ethylene	24.65	24.86	25.00	14.94	14.46	--
Ethane	9.38	10.21	10.27	4.09	4.14	--
Acetylene	5.83	7.73	4.95	0.00	0.00	--
Propane	1.04	0.00	0.00	0.03	0.00	--
Propylene	4.56	5.57	4.44	1.42	2.26	--
Benzene	6.86	8.78	6.13	2.08	2.10	--
Toluene	17.41	23.05	21.25	0.00	2.89	--
Toluene Individual HC	92.4	106.6	104.9	29.7	31.0	--
Total as % of THC, %	24.3	26.0	30.9	21.2	22.1	--
Organic Sulfides						
Carbonyl Sulfide	0.02	0.02	0.01	0.00	0.00	0.00
Methyl Sulfide	0.01	0.00	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-9 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 09 - 1978 FORD FIESTA

		EMISSION RATE, MG/KM					
		FTP			HFET		
		As Received		After Tune-up	As Received		After Tune-up
Test Number, VVT		091	092	096	091	092	096
Trace Elements							
Sodium	Na						
Sulfur	S	0.18	0.34	0.08	2.06	2.55	0.47
Vanadium	V		0.01	0.01		0.01	
Cadmium	Cd						
Magnesium	Mg						
Chlorine	Cl			0.01			0.01
Chromium	Cr						
Copper	Cu						
Tin	Sn						
Lead	Pb						
Aluminum	Al		0.01	0.01		0.01	
Potassium	K						0.01
Manganese	Mn						
Zinc	Zn		0.01	0.04		0.02	
Antimony	Sb						
Silicon	Si	0.01	0.02		0.01	0.01	
Calcium	Ca	0.06	0.06	0.08	0.02	0.03	0.03
Iron	Fe	0.08	0.02	0.19			0.03
Barium	Ba						
Phosphorus	P			0.02			
Titanium	Ti						
Bronine	Br						
Arsenic	As						
Molybdenum	Mo	0.21	0.29	0.18	0.11	0.23	
Tungsten	W			0.05			
Strontium	Sr	0.13	0.17	0.16	0.08	0.15	0.07

Note: Nickel, mercury, selenium, cobalt and platinum were analyzed for, but not detected.

TABLE B-10. SUMMARY OF EMISSION RESULTS CAR 10 - 1978 CHRYSLER NEW YORKER

	Emission Rate, mg/km (Except as Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	101	102	106	107	101	102	106	107
Barometer, mm Hg	744.7	740.2	737.9	736.6	744.7	740.2	737.9	737.4
Humidity, g/km	12.6	13.1	11.2	12.2	11.8	10.8	10.0	11.3
Temperature, °C	25.6	28.3	25.6	23.3	31.1	30.0	26.7	25.6
Total Fuel Sulfur, mg/km	31.45	33.26	29.39	28.98	19.94	21.60	19.52	19.44
Avg. Exh. Oxygen, %	--	1.59	1.40	1.11	--	3.82	1.85	1.70
Catalyst Avg. Temp., °C	--	--	--	--	--	--	--	--
Catalyst Max. Temp., °C	--	--	--	--	--	--	--	--
Carbon Dioxide, g/km	384.6	401.6	404.6	398.2	282.1	294.6	279.5	278.2
Fuel Cons., ℓ/100 km	19.32	20.43	18.05	17.80	12.25	13.27	11.99	11.94
Regulated Emissions								
Hydrocarbons, (THC), g/km	2.84	11.00	0.84	0.81	0.38	3.85	0.14	0.15
Carbon Monoxide, g/km	37.60	26.84	9.98	10.31	2.33	2.64	0.61	0.72
Oxides of Nitrogen, g/km	2.28	2.69	1.84	1.92	1.49	1.83	1.15	1.31
Particulates								
Total Particulates	264.23	195.43	84.49	82.32	71.46	112.49	60.92	62.86
Compound Group Totals								
Aldehydes & Ketones	19.8	9.8	10.2	1.8	8.1	34.7	4.2	0.0
Individual Hydrocarbons	1262.1	1929.9	555.7	385.5	290.2	772.9	67.6	74.8
Organic Sulfides	0.03	0.05	0.02	0.03	0.01	0.02	0.05	0.01
Organic Amines	0.00	0.01	0.00	0.00	0.00	0.05	0.00	0.00
Other Compounds								
Ammonia	3.29	1.30	3.21	5.39	1.77	0.98	3.71	0.84
Cyanide & Cyanogen	1.91	0.79	0.27	0.19	0.12	0.19	0.10	0.14
Hydrogen Sulfide	0.25	0.42	0.39	0.15	0.13	0.00	0.00	0.11
Nitrous Oxide	12.94	20.26	12.29	13.57	13.01	11.20	7.78	9.28

TABLE B-10 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 10 - 1978 CHRYSLER NEW YORKER

	Emission Rate, mg/km (Except at Noted)							
	FTP				HFET			
	As-Received		After Tune-up		As-Received		After Tune-up	
Test Number, VVT	101	102	106	107	101	102	106	107
Aldehydes and Ketones								
Formaldehyde	17.01	8.99	9.86	1.76	6.44	33.81	3.36	0.00
Acetaldehyde	2.82	0.83	0.35	0.00	1.66	0.91	0.79	0.00
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--
Methylethylketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	19.8	9.8	10.2	1.8	8.1	34.7	4.2	0.0
Total as % of THC, %	0.7	0.1	1.2	0.2	2.1	0.9	3.0	0.0
Individual Hydrocarbons								
Methane	293.46	248.53	83.07	88.38	74.68	50.28	16.93	21.48
Ethylene	301.62	178.22	254.75	89.48	70.75	160.66	15.57	18.86
Ethane	33.92	24.92	20.10	19.41	13.19	13.15	4.15	4.64
Acetylene	129.05	69.73	29.06	23.03	24.00	6.39	3.11	4.70
Propane	0.98	1.81	0.00	5.54	0.00	0.00	0.00	0.00
Propylene	105.46	87.47	38.25	39.34	27.60	151.84	7.02	5.86
Benzene	130.88	266.97	42.08	41.98	31.01	98.32	7.27	7.16
Toluene	266.75	1052.27	88.34	78.29	48.94	292.25	13.55	12.06
Toluene Individual HC	1262.1	1929.9	555.7	385.5	290.2	772.9	67.6	74.8
Total as % of THC, %	44.4	17.5	66.2	47.6	76.4	20.1	48.3	49.9
Organic Sulfides								
Carbonyl Sulfide	0.03	0.03	0.02	0.02	0.01	0.01	0.02	0.00
Methyl Sulfide	0.00	0.02	0.02	0.02	0.00	0.01	0.03	0.01
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines								
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00
Monoethylamine	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-10 (Cont'd). SUMMARY OF EMISSION RESULTS CAR 10 - 1978 CHRYSLER NEW YORKER

		EMISSION RATE, MG/KM							
		FTP				HFET			
		As Received		After Tune-up		As Received		After Tune-up	
Test Number, VVT		101	102	106	107	101	102	106	107
Trace Elements									
Sodium	Na	0.25	0.26	0.10		0.04	0.14	0.06	
Sulfur	S	1.06	1.50	0.29	0.27	0.70	0.86	1.31	1.44
Vanadium	V	0.02	0.01	0.01	0.01		0.01	0.01	
Cadmium	Cd	0.01	0.01						
Magnesium	Mg	0.34	0.40	0.11	0.12	0.08	0.17	0.03	0.06
Chlorine	Cl	0.41	0.50	0.08	0.08	0.19	0.52	0.05	0.09
Chromium	Cr								
Copper	Cu	0.03	0.04	0.01					
Tin	Sn	0.03	0.03				0.01		
Lead	Pb	0.80	1.18		0.09	0.12	0.47		
Aluminum	Al	0.13	0.29	0.01	0.02	0.03	0.15	0.01	0.01
Potassium	K	0.01	0.01						
Manganese	Mn	0.16	0.41			0.06	0.20		
Zinc	Zn	1.75	2.14	0.15	0.25	0.29	0.79	0.07	0.18
Antimony	Sb	0.01	0.01						
Silicon	Si	0.35	0.45	0.05	0.06	0.172	2.57	0.40	0.49
Calcium	Ca	1.80	2.06	0.45	0.60	0.39	0.89	0.18	0.28
Iron	Fe	8.57	9.88	0.48	0.39	1.81	6.65	0.28	0.47
Barium	Ba	0.01	0.01				0.01		
Phosphorus	P	1.13	1.27	0.22	0.30	0.24	0.50	0.07	0.17
Titanium	Ti	0.01	0.01				0.01		
Bromine	Br		0.03				0.06	0.06	
Arsenic	As	0.02					0.07		
Molybdenum	Mo	0.52	0.49	0.17	0.38	0.13	0.28	0.43	0.15
Tungsten	W	0.13	0.12		0.07			0.06	
Strontium	Sr	0.32	0.28	0.12	0.20	0.14	0.18	0.21	0.09

Note: Nickel, mercury, selenium, cobalt and platinum were analyzed for, but not detected.

APPENDIX C

FTP INDIVIDUAL SAMPLE RESULTS

TABLE C-1. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 01 AS-RECEIVED

	Test 011 Emissions in mg/km COLD-UDDS	Test 011 Emissions in mg/km HOT-UDDS
Total Particulate	60.42	21.69
Ammonia	18.92	3.83
Cyanides & Cyanogen	2.32	1.09
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	6.80	5.18
Acetaldehyde	0.80	0.35
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.03	0.23
Methyl sulfide	0.03	0.10
Ethyl sulfide	0.00	0.01
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.02	0.04
Trimethylamine	0.02	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS 1	 COLD-UDDS 2	 HOT-UDDS 3	 HOT-UDDS 4
Individual Hydrocarbons				
Methane	19.34	4.54	4.22	2.86
Ethylene	25.13	9.93	8.93	4.58
Ethane	2.92	1.25	1.66	0.93
Acetylene	13.61	0.13	0.31	0.00
Propane	0.16	0.00	0.00	0.00
Propylene	10.55	4.69	4.18	2.14
Benzene	13.57	5.67	4.81	3.59
Toluene	22.39	9.69	7.21	3.93
N_2O	0.64	0.84	1.33	0.76

	Test 012 Emissions in mg/km COLD-UDDS	Test 012 Emissions in mg/km HOT-UDDS
Total Particulate	25.14	23.31
Ammonia	3.12	1.68
Cyanides & Cyanogen	3.70	1.34
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	9.52	13.46
Acetaldehyde	0.35	4.48
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.29	0.05
Methyl sulfide	0.09	0.03
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.04	0.06
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS 1	 COLD-UDDS 2	 HOT-UDDS 3	 HOT-UDDS 4
Individual Hydrocarbons				
Methane	15.40	3.53	3.74	2.36
Ethylene	19.96	6.95	6.13	2.62
Ethane	2.73	1.38	1.73	1.07
Acetylene	10.69	0.00	0.35	0.00
Propane	0.17	0.07	0.07	0.08
Propylene	8.39	3.40	2.86	1.18
Benzene	11.64	7.31	3.82	2.70
Toluene	19.08	7.35	4.73	2.23
N_2O	0.25	0.81	1.00	0.60

TABLE C-2. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 02 AS-RECEIVED

	Test 021 Emissions in mg/km COLD-UDDS	 HOT-UDDS
Total Particulate	25.26	16.37
Ammonia	8.45	5.38
Cyanides & Cyanogen	0.00	0.01
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	0.00	0.00
Acetaldehyde	1.40	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.47	0.75
Methyl sulfide	0.01	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Test 022 Emissions in mg/km COLD-UDDS	 HOT-UDDS
Total Particulate	9.37	16.28
Ammonia	5.46	27.16
Cyanides & Cyanogen	0.27	0.19
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	0.00	0.00
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.26	0.24
Methyl sulfide	0.00	0.01
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	14.85	5.29	6.83	6.07
Ethylene	7.39	1.37	3.57	1.24
Ethane	2.01	1.19	1.76	1.44
Acetylene	5.49	0.00	0.00	0.00
Propane	0.16	0.12	0.09	0.03
Propylene	2.51	0.00	0.86	0.00
Benzene	4.53	0.33	1.27	0.30
Toluene	7.47	0.45	2.04	0.12
N_2O	2.09	1.32	3.04	1.14

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	14.16	5.35	5.82	5.03
Ethylene	6.86	0.91	2.74	1.11
Ethane	1.86	1.17	1.62	1.11
Acetylene	4.21	0.00	0.00	0.00
Propane	0.11	0.04	0.04	0.01
Propylene	2.41	0.00	0.76	0.00
Benzene	4.42	0.34	1.13	0.44
Toluene	6.89	0.71	1.61	0.00
N_2O	2.24	1.31	3.31	1.43

TABLE C-3. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 03 AS-RECEIVED

	Test 031 Emissions in mg/km		Test 032 Emissions in mg/km	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	21.01	32.36	19.26	20.44
Ammonia	2.85	0.40	--	--
Cyanides & Cyanogen	0.17	0.02	0.12	0.01
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Aldehydes & Ketones				
Formaldehyde	--	--	4.11	1.95
Acetaldehyde	--	--	1.25	0.87
Acetone	--	--	0.00	0.00
Isobutyraldehyde	--	--	--	--
Methyl ethyl ketone	--	--	0.00	0.00
Hexanaldehyde	--	--	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.30	1.27	0.13	0.16
Methyl sulfide	0.09	0.11	0.01	0.00
Ethyl sulfide	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.05	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.08	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Test 031 Emissions in ppm				Test 032 Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	11.95	3.95	6.90	4.74	12.25	5.64	10.51	7.24
Ethylene	6.00	0.72	2.27	0.00	5.05	0.46	3.19	0.17
Ethane	2.25	1.32	1.86	0.00	2.11	1.18	1.76	0.87
Acetylene	4.97	0.00	0.00	0.82	3.49	0.00	0.00	0.00
Propane	0.10	0.00	0.00	0.00	0.07	0.00	0.00	0.00
Propylene	2.00	0.00	0.57	0.00	1.68	0.00	0.65	0.00
Benzene	4.54	1.10	1.49	0.52	3.99	0.51	1.96	0.42
Toluene	9.71	1.40	2.99	0.23	8.11	0.74	3.04	0.44
N_2O	2.75	1.30	2.19	1.12	3.26	1.25	2.48	0.93

TABLE C-4. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 03 AFTER TUNEUP

	Test 036 Emissions in mg/km COLD-UDDS	Test 036 Emissions in mg/km HOT-UDDS		Test 037 Emissions in mg/km COLD-UDDS	Test 037 Emissions in mg/km HOT-UDDS
Total Particulate	22.67	13.52	Total Particulate	18.65	10.90
Ammonia	4.06	6.43	Ammonia	0.53	1.94
Cyanides & Cyanogen	0.37	0.00	Cyanides & Cyanogen	0.30	0.62
Hydrogen Sulfide	0.00	0.00	Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones			**Aldehydes & Ketones**		
Formaldehyde	2.19	0.00	Formaldehyde	1.88	0.21
Acetaldehyde	0.00	0.00	Acetaldehyde	0.00	0.00
Acetone	0.00	0.00	Acetone	0.00	0.00
Isobutyraldehyde	--	--	Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00	Methyl ethyl ketone	0.95	2.43
Hexanaldehyde	0.00	0.00	Hexanaldehyde	0.00	0.00
Organic Sulfides			**Organic Sulfides**		
Carbonyl sulfide	0.10	0.14	Carbonyl sulfide	0.07	0.07
Methyl sulfide	0.00	0.00	Methyl sulfide	0.02	0.05
Ethyl sulfide	0.00	0.00	Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00	Methyl disulfide	0.00	0.00
Organic Amines			**Organic Amines**		
Monomethylamine	0.03	0.00	Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.01	0.00	Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00	Diethylamine	0.00	0.00
Triethylamine	0.00	0.00	Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS 1	 COLD-UDDS 2	 HOT-UDDS 3	 HOT-UDDS 4		Emissions in ppm COLD-UDDS 1	 COLD-UDDS 2	 HOT-UDDS 3	 HOT-UDDS 4
Individual Hydrocarbons					**Individual Hydrocarbons**				
Methane	7.13	6.28	10.06	7.70	Methane	10.04	7.20	10.02	8.52
Ethylene	4.33	0.59	2.84	0.22	Ethylene	5.06	0.53	2.69	0.15
Ethane	1.75	1.22	1.71	1.05	Ethane	1.75	1.10	1.64	0.87
Acetylene	2.68	0.00	0.00	0.00	Acetylene	4.30	0.00	0.00	0.00
Propane	0.23	0.16	0.17	0.20	Propane	0.02	0.01	0.00	0.00
Propylene	1.87	0.00	0.49	0.00	Propylene	1.93	0.00	0.55	0.00
Benzene	3.43	0.38	1.37	0.20	Benzene	4.03	0.94	1.49	0.54
Toluene	9.45	0.81	2.72	0.30	Toluene	10.72	0.87	2.66	0.15
N_2O	3.48	1.58	2.30	0.00	N_2O	2.99	1.23	2.29	0.79

TABLE C-5. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 04 AS-RECEIVED

	Test 041 Emissions in mg/km COLD-UDDS	HOT-UDDS
Total Particulate	45.75	26.80
Ammonia	4.67	12.69
Cyanides & Cyanogen	0.84	0.35
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	7.73	5.13
Acetaldehyde	3.34	1.46
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.00	0.00
Methyl sulfide	0.00	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Test 042 Emissions in mg/km COLD-UDDS	HOT-UDDS
Total Particulate	45.68	31.11
Ammonia	0.56	1.11
Cyanides & Cyanogen	0.51	0.84
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	4.55	4.46
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.00	0.00
Methyl sulfide	0.00	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	16.67	8.88	17.27	8.44
Ethylene	19.37	3.06	16.57	2.92
Ethane	5.21	3.45	4.94	3.32
Acetylene	5.16	0.00	7.39	0.00
Propane	0.42	0.25	0.28	0.23
Propylene	7.92	0.96	5.43	0.90
Benzene	8.67	2.47	7.61	1.80
Toluene	19.13	3.50	15.67	3.04
N_2O	0.21	0.10	0.34	0.13

	Emissions in ppm COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	16.20	9.26	15.87	8.48
Ethylene	20.61	3.47	14.22	3.33
Ethane	5.54	3.64	4.75	3.41
Acetylene	3.68	0.00	5.10	0.00
Propane	0.34	0.22	0.23	0.12
Propylene	8.48	1.15	5.09	0.92
Benzene	8.90	2.03	6.58	1.39
Toluene	19.16	3.40	13.66	1.90
N_2O	0.16	0.10	0.47	0.16

TABLE C-6. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSION RESULTS
CAR 04 AFTER TUNEUP

	Test 046 Emissions in mg/km COLD-UDDS	 HOT-UDDS
Total Particulate	42.49	45.68
Ammonia	3.35	3.40
Cyanides & Cyanogen	1.32	0.73
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	7.14	7.54
Acetaldehyde	1.96	1.46
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.00	0.00
Methyl sulfide	0.00	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.01	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS		 HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	27.31	6.35	10.30	5.80
Ethylene	22.67	4.00	11.97	3.56
Ethane	5.64	3.59	4.32	3.19
Acetylene	28.95	0.00	1.37	0.00
Propane	0.21	0.07	0.04	0.00
Propylene	8.97	1.06	3.82	0.85
Benzene	11.16	1.71	4.19	1.27
Toluene	26.10	4.18	9.08	2.49
N_2O	0.16	0.07	0.30	0.11

TABLE C-7. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS

CAR 05 AS-RECEIVED

Test 051

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	10.33	3.83
Ammonia	13.77	21.63
Cyanides & Cyanogen	0.48	0.67
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	5.74	1.39
Acetaldehyde	0.69	0.57
Acetone	12.24	7.15
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.27	0.02
Methyl sulfide	0.04	0.01
Ethyl sulfide	0.04	0.00
Methyl disulfide	0.01	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	7.44	3.74	5.06	3.79
Ethylene	6.90	3.60	3.81	4.54
Ethane	1.77	1.03	1.35	1.12
Acetylene	2.87	0.00	0.00	0.00
Propane	0.19	0.00	0.11	0.15
Propylene	3.22	1.41	1.46	1.75
Benzene	4.96	2.91	3.00	3.17
Toluene	8.20	3.27	3.82	3.60
N_2O	5.24	1.43	6.11	1.62

Test 052

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	9.87	10.31
Ammonia	18.76	20.62
Cyanides & Cyanogen	0.91	0.80
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	0.55	0.00
Acetaldehyde	1.80	0.52
Acetone	6.95	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.09	0.02
Methyl sulfide	0.01	0.00
Ethyl sulfide	0.01	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	7.47	3.77	4.89	3.61
Ethylene	7.30	3.66	3.35	3.15
Ethane	1.71	1.02	1.23	0.97
Acetylene	2.33	0.00	0.00	0.00
Propane	0.11	0.04	0.00	0.04
Propylene	3.47	1.60	1.39	1.38
Benzene	5.01	3.21	2.84	2.74
Toluene	8.09	3.68	3.02	2.37
N_2O	6.24	1.31	8.41	1.47

TABLE C-8. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 05 AFTER TUNEUP

	Test 056 Emissions in mg/km		Test 057 Emissions in mg/km	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	--	4.06	3.05	1.24
Ammonia	24.53	30.61	30.72	38.20
Cyanides & Cyanogen	1.01	0.96	0.72	0.70
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Aldehydes & Ketones				
Formaldehyde	0.84	0.00	1.07	0.00
Acetaldehyde	0.66	0.45	1.53	0.77
Acetone	1.29	3.35	0.00	0.00
Isobutyraldehyde	--	--	--	--
Methyl ethyl ketone	0.00	0.40	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.07	0.03	0.03	0.01
Methyl sulfide	0.01	0.01	0.01	0.00
Ethyl sulfide	0.01	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Test 056 Emissions in ppm				Test 057 Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	6.89	4.11	5.10	3.65	7.03	3.47	4.77	3.35
Ethylene	6.54	4.23	3.34	3.80	6.22	2.33	2.43	2.24
Ethane	1.63	1.09	1.27	1.08	1.64	0.92	1.19	0.88
Acetylene	1.68	0.00	0.00	0.00	2.31	0.00	0.00	0.00
Propane	0.73	0.00	0.00	0.00	0.17	0.00	0.00	0.00
Propylene	3.20	1.72	1.42	1.59	2.93	0.96	1.00	0.84
Benzene	4.48	3.16	2.69	2.82	4.39	2.33	2.25	1.98
Toluene	9.02	4.81	3.78	3.83	8.27	2.49	2.74	1.77
N_2O	7.28	1.74	8.26	2.04	7.30	1.59	7.07	1.70

TABLE C-9. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 06 AS-RECEIVED

	Test 061 Emissions in mg/km		Test 062 Emissions in mg/km	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	21.68	15.80	25.61	16.15
Ammonia	17.50	15.62	12.59	9.08
Cyanides & Cyanogen	6.71	5.60	7.29	4.07
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Aldehydes & Ketones				
Formaldehyde	1.63	0.42	1.83	0.93
Acetaldehyde	2.66	1.36	3.43	1.56
Acetone	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--
Methyl ethyl ketone	0.51	0.00	0.63	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.01	0.09	0.05	0.01
Methyl sulfide	0.00	0.00	0.00	0.00
Ethyl sulfide	0.00	0.00	0.02	0.01
Methyl disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Test 061 Emissions in ppm				Test 062 Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	12.49	3.04	5.00	2.26	14.06	2.37	3.20	2.01
Ethylene	18.46	3.09	7.23	1.56	19.01	1.68	4.00	0.72
Ethane	2.30	0.99	1.45	0.77	2.22	0.68	1.00	0.57
Acetylene	7.80	0.00	0.33	0.00	12.35	0.00	0.07	0.00
Propane	0.17	0.00	0.00	0.00	0.28	0.00	0.00	0.00
Propylene	8.08	1.41	3.09	0.70	8.08	0.83	1.91	0.00
Benzene	9.73	2.80	3.58	1.44	10.81	2.25	2.46	0.99
Toluene	19.78	4.21	5.83	2.14	22.21	3.64	4.28	1.59
N_2O	2.78	4.16	5.94	4.03	2.64	5.25	6.67	4.11

TABLE C-10. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 06 AFTER TUNEUP

	Test 066 Emissions in mg/km COLD-UDDS	Test 066 Emissions in mg/km HOT-UDDS	Test 067 Emissions in mg/km COLD-UDDS	Test 067 Emissions in mg/km HOT-UDDS
Total Particulate	13.53	12.21	33.94	14.10
Ammonia	10.42	8.39	4.83	3.95
Cyanides & Cyanogen	2.87	1.41	2.20	1.72
Hydrogen Sulfide	0.00	0.00	0.20	0.00
Aldehydes & Ketones				
Formaldehyde	2.21	1.32	1.71	0.00
Acetaldehyde	2.70	1.19	1.32	0.00
Acetone	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	0.00	--	--
Methyl ethyl ketone	0.49	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.04	0.03	0.02	0.00
Methyl sulfide	0.00	0.03	0.01	0.00
Ethyl sulfide	0.02	0.01	0.02	0.00
Methyl disulfide	0.00	0.00	0.01	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Test 066 Emissions in ppm COLD-UDDS		Test 066 Emissions in ppm HOT-UDDS		Test 067 Emissions in ppm COLD-UDDS		Test 067 Emissions in ppm HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	12.87	2.90	5.89	2.60	16.47	2.80	3.57	0.34
Ethylene	15.58	1.17	5.63	1.21	16.85	1.00	4.97	1.09
Ethane	2.20	0.79	1.42	0.93	2.17	0.70	1.23	0.69
Acetylene	9.35	0.00	0.30	0.00	14.16	0.00	0.00	0.00
Propane	0.30	0.20	0.30	0.28	0.41	0.00	0.02	0.01
Propylene	6.50	0.27	2.03	0.36	6.88	0.39	2.01	0.35
Benzene	8.72	1.48	2.87	1.10	11.02	1.28	2.81	1.09
Toluene	16.36	2.06	4.39	0.87	25.63	2.11	4.68	1.92
N_2O	1.72	1.00	3.02	0.99	1.26	0.79	2.00	0.74

TABLE C-11. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 07 AS-RECEIVED

	Test 071 Emissions in mg/km		Test 072 Emissions in mg/km	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	19.07	33.38	38.02	31.57
Ammonia	5.19	1.65	1.93	2.22
Cyanides & Cyanogen	1.25	0.17	1.01	0.59
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Aldehydes & Ketones				
Formaldehyde	8.69	4.83	6.54	6.00
Acetaldehyde	3.62	1.93	0.00	0.00
Acetone	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.05	0.11	0.02	0.01
Methyl sulfide	0.00	0.01	0.00	0.01
Ethyl sulfide	0.04	0.00	0.01	0.01
Methyl disulfide	0.03	0.00	0.01	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Test 071 Emissions in ppm				Test 072 Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	10.70	6.39	6.88	7.22	10.49	7.60	6.94	7.00
Ethylene	12.24	2.79	4.95	2.63	13.60	2.75	5.41	2.71
Ethane	1.78	0.93	1.22	0.97	1.90	0.93	1.17	0.92
Acetylene	4.03	0.32	0.51	0.36	4.39	0.00	0.48	0.28
Propane	0.19	0.10	0.13	0.00	0.16	0.00	0.00	0.00
Propylene	4.42	0.78	1.52	0.96	5.51	0.86	1.54	0.79
Benzene	5.11	1.34	2.14	1.23	6.70	1.54	2.52	1.34
Toluene	10.62	2.06	2.76	1.84	14.92	2.46	3.77	1.91
N_2O	0.19	0.00	0.03	0.04	0.22	0.00	0.08	0.00

TABLE C-12. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 07 AFTER TUNEUP

Test 076

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	38.81	28.48
Ammonia	16.00	13.38
Cyanides & Cyanogen	0.12	0.02
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	--	7.15
Acetaldehyde	--	1.70
Acetone	--	0.00
Isobutyraldehyde	--	0.00
Methyl ethyl ketone	--	0.00
Hexanaldehyde	--	0.00
Organic Sulfides		
Carbonyl sulfide	0.01	0.01
Methyl sulfide	0.01	0.01
Ethyl sulfide	0.03	0.01
Methyl disulfide	0.02	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	9.93	5.98	6.13	5.85
Ethylene	13.49	2.93	4.80	3.03
Ethane	1.82	0.88	1.04	0.89
Acetylene	3.94	0.28	0.48	0.29
Propane	0.00	0.00	0.00	0.00
Propylene	5.31	0.70	1.44	0.76
Benzene	6.07	1.31	1.95	1.30
Toluene	12.42	2.17	2.95	1.81
N_2O	0.22	0.01	0.11	0.10

Test 078

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	49.86	38.09
Ammonia	14.23	8.30
Cyanides & Cyanogen	0.54	0.42
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	8.42	7.13
Acetaldehyde	1.11	0.63
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.05	0.02
Methyl sulfide	0.01	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	10.04	3.93	5.88	3.92
Ethylene	13.91	3.07	6.45	3.00
Ethane	1.63	0.66	0.95	0.64
Acetylene	3.32	0.00	0.36	0.13
Propane	0.06	0.02	0.00	0.00
Propylene	5.34	0.78	1.81	0.71
Benzene	6.39	1.29	2.59	1.16
Toluene	12.06	2.21	4.57	1.57
N_2O	0.11	0.01	0.05	0.01

TABLE C-13. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 08 AS-RECEIVED

	Test 081		Test 082	
	Emissions in mg/km		Emissions in mg/km	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	25.37	12.22	30.00	15.85
Ammonia	1.85	3.40	4.16	15.71
Cyanides & Cyanogen	2.14	0.76	2.04	0.37
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Aldehydes & Ketones				
Formaldehyde	4.73	5.63	6.96	4.19
Acetaldehyde	0.00	0.00	0.00	0.00
Acetone	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.04	0.00	0.03	0.02
Methyl sulfide	0.02	0.01	0.04	0.00
Ethyl sulfide	0.12	0.00	0.01	0.00
Methyl disulfide	0.01	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Test 081				Test 082			
	Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	4.28	0.31	1.66	0.66	6.11	0.87	2.37	0.59
Ethylene	9.53	0.29	2.94	0.20	11.23	0.34	3.19	0.27
Ethane	1.17	0.24	0.64	0.26	1.34	0.44	0.75	0.38
Acetylene	3.91	0.00	0.00	0.00	4.13	0.00	0.00	0.00
Propane	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00
Propylene	4.52	0.00	0.94	0.00	5.11	0.00	1.04	0.00
Benzene	4.77	0.19	1.63	0.00	5.68	0.16	1.52	0.00
Toluene	11.24	0.73	3.88	0.15	13.23	0.99	3.05	0.00
N_2O	2.31	0.89	2.34	0.67	1.47	0.75	2.08	0.55

TABLE C-14. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 08 AFTER TUNEUP

	Test 086 Emissions in mg/km COLD-UDDS	 HOT-UDDS
Total Particulate	49.39	28.28
Ammonia	3.28	3.56
Cyanides & Cyanogen	2.20	1.80
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	1.50	3.17
Acetaldehyde	0.00	1.05
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.01	0.06
Methyl sulfide	0.06	0.04
Ethyl sulfide	0.00	0.01
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS 1	 2	 HOT-UDDS 3	 4
Individual Hydrocarbons				
Methane	11.75	2.37	4.44	2.07
Ethylene	15.44	1.78	7.15	1.40
Ethane	2.09	0.95	1.42	0.87
Acetylene	9.46	0.00	0.00	0.00
Propane	0.26	0.00	0.18	0.00
Propylene	6.52	0.79	3.09	0.61
Benzene	9.35	2.18	3.71	1.29
Toluene	17.14	2.70	6.68	1.91
N_2O	0.98	0.60	1.95	0.62

	Test 087 Emissions in mg/km COLD-UDDS	 HOT-UDDS
Total Particulate	50.03	28.83
Ammonia	4.52	4.34
Cyanides & Cyanogen	2.68	1.86
Hydrogen Sulfide	0.10	0.00
Aldehydes & Ketones		
Formaldehyde	0.20	0.00
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.02	0.02
Methyl sulfide	0.01	0.01
Ethyl sulfide	0.01	0.01
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS 1	 2	 HOT-UDDS 3	 4
Individual Hydrocarbons				
Methane	13.03	2.60	4.57	2.19
Ethylene	16.53	1.87	6.67	1.47
Ethane	2.16	1.03	1.45	0.94
Acetylene	11.43	0.00	0.00	0.00
Propane	0.15	0.00	0.00	0.00
Propylene	7.67	0.83	2.96	0.63
Benzene	9.05	1.73	3.77	1.45
Toluene	21.34	2.97	7.68	2.11
N_2O	0.84	0.84	2.09	0.61

TABLE C-15. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 09 AS-RECEIVED

Test 091

Emissions in mg/km

	COLD-UDDS	HOT-UDDS
Total Particulate	39.82	38.00
Ammonia	4.48	1.40
Cyanides & Cyanogen	0.44	0.26
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	0.00	0.00
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.00	0.04
Methyl sulfide	0.00	0.01
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	5.22	1.10	1.64	1.02
Ethylene	5.67	1.32	3.86	1.17
Ethane	1.15	0.76	1.03	0.76
Acetylene	4.03	0.00	0.00	0.00
Propane	0.12	0.08	0.14	0.07
Propylene	1.67	0.00	0.92	0.00
Benzene	2.67	0.00	1.10	0.25
Toluene	7.65	0.48	2.54	0.00
N_2O	0.32	0.13	0.47	0.15

Test 092

Emissions in mg/km

	COLD-UDDS	HOT-UDDS
Total Particulate	36.90	27.23
Ammonia	2.69	1.72
Cyanides & Cyanogen	0.33	0.05
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	3.99	2.93
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.01	0.02
Methyl sulfide	0.00	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

Emissions in ppm

	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	6.19	1.38	1.74	1.18
Ethylene	5.52	1.15	4.25	1.07
Ethane	1.19	0.88	1.08	0.81
Acetylene	5.22	0.00	0.00	0.00
Propane	0.00	0.00	0.00	0.00
Propylene	1.78	0.00	1.28	0.00
Benzene	2.91	0.35	1.45	0.21
Toluene	8.83	0.76	3.93	0.00
N_2O	0.47	0.16	0.60	0.20

TABLE C-16. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 09 AFTER TUNEUP

	Test 096 Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	37.38	30.44
Ammonia	2.87	1.67
Cyanides & Cyanogen	0.48	0.26
Hydrogen Sulfide	0.00	0.00
Aldehydes & Ketones		
Formaldehyde	1.12	1.51
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.02	0.01
Methyl sulfide	0.01	0.00
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	5.57	2.28	2.36	2.28
Ethylene	6.04	1.27	3.67	1.27
Ethane	1.30	0.86	1.04	0.86
Acetylene	3.40	0.00	0.00	0.00
Propane	0.22	0.00	0.00	0.00
Propylene	1.89	0.00	0.71	0.00
Benzene	2.66	0.00	1.17	0.00
Toluene	7.98	0.60	3.06	0.60
N_2O	0.34	0.13	0.46	0.01

TABLE C-17. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 10 AS-RECEIVED

	Test 101 Emissions in mg/km COLD-UDDS	Test 101 Emissions in mg/km HOT-UDDS		Test 102 Emissions in mg/km COLD-UDDS	Test 102 Emissions in mg/km HOT-UDDS
Total Particulate	177.09	329.96	Total Particulate	160.89	221.48
Ammonia	3.71	2.97	Ammonia	3.08	3.31
Cyanides & Cyanogen	0.92	2.65	Cyanides & Cyanogen	0.91	0.70
Hydrogen Sulfide	0.25	0.25	Hydrogen Sulfide	0.42	0.42
Aldehydes & Ketones			Aldehydes & Ketones		
Formaldehyde	19.80	14.91	Formaldehyde	15.28	4.24
Acetaldehyde	4.10	1.86	Acetaldehyde	1.94	0.00
Acetone	0.00	0.00	Acetone	0.00	0.00
Isobutyraldehyde	--	--	Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00	Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00	Hexanaldehyde	0.00	0.00
Organic Sulfides			Organic Sulfides		
Carbonyl sulfide	0.05	0.02	Carbonyl sulfide	0.03	0.03
Methyl sulfide	0.00	0.00	Methyl sulfide	0.02	0.02
Ethyl sulfide	0.00	0.00	Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00	Methyl disulfide	0.00	0.00
Organic Amines			Organic Amines		
Monomethylamine	0.00	0.00	Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00	Monoethylamine + dimethylamine	0.02	0.00
Trimethylamine	0.00	0.00	Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00	Diethylamine	0.00	0.00
Triethylamine	0.00	0.00	Triethylamine	0.00	0.00

	Emissions in ppm COLD-UDDS 1	COLD-UDDS 2	HOT-UDDS 3	HOT-UDDS 4		Emissions in ppm COLD-UDDS 1	COLD-UDDS 2	HOT-UDDS 3	HOT-UDDS 4
Individual Hydrocarbons					Individual Hydrocarbons				
Methane	36.62	24.97	25.74	21.25	Methane	45.95	20.20	20.50	11.97
Ethylene	38.56	29.41	30.62	27.40	Ethylene	36.97	15.71	21.47	9.04
Ethane	4.64	2.80	3.38	2.73	Ethane	4.33	1.96	2.57	1.61
Acetylene	27.84	10.39	20.93	6.57	Acetylene	33.99	0.00	10.14	0.00
Propane	0.37	0.00	0.15	0.00	Propane	0.44	0.17	0.26	0.00
Propylene	18.15	9.08	10.89	8.33	Propylene	18.23	7.07	10.32	5.03
Benzene	23.36	12.91	14.22	11.05	Benzene	54.45	22.78	41.05	14.91
Toluene	58.10	25.55	22.77	20.95	Toluene	202.84	84.55	157.98	63.27
N_2O	0.68	0.00	0.58	0.42	N_2O	0.55	0.58	0.76	0.54

TABLE C-18. FTP INDIVIDUAL SAMPLE UNREGULATED EMISSIONS RESULTS
CAR 10 AFTER TUNEUP

Test 106

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	77.35	89.88
Ammonia	0.94	2.39
Cyanides & Cyanogen	0.01	0.46
Hydrogen Sulfide	0.24	0.51
Aldehydes & Ketones		
Formaldehyde	12.77	7.67
Acetaldehyde	0.00	0.61
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.04	0.01
Methyl sulfide	0.02	0.02
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.00	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	18.83	4.64	8.07	3.07
Ethylene	27.43	5.88	12.03	1.43
Ethane	3.70	1.74	1.80	1.32
Acetylene	13.41	0.00	5.09	0.00
Propane	0.00	0.00	0.00	0.00
Propylene	12.67	2.89	5.27	0.00
Benzene	12.71	3.58	5.93	1.07
Toluene	26.49	7.64	11.15	2.73
N_2O	0.40	0.29	0.52	0.28

Test 107

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	86.99	78.80
Ammonia	5.55	2.32
Cyanides & Cyanogen	0.26	0.13
Hydrogen Sulfide	0.22	0.10
Aldehydes & Ketones		
Formaldehyde	3.89	0.15
Acetaldehyde	0.00	0.00
Acetone	0.00	0.00
Isobutyraldehyde	--	--
Methyl ethyl ketone	0.00	0.00
Hexanaldehyde	0.00	0.00
Organic Sulfides		
Carbonyl sulfide	0.03	0.01
Methyl sulfide	0.01	0.01
Ethyl sulfide	0.00	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.01	0.00
Monoethylamine + dimethylamine	0.00	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	21.00	5.56	6.79	3.82
Ethylene	28.75	5.58	9.95	2.75
Ethane	3.55	1.73	1.69	1.30
Acetylene	12.43	0.00	2.70	0.00
Propane	0.00	0.00	0.00	1.51
Propylene	12.15	2.79	4.14	1.31
Benzene	13.16	3.37	4.84	1.67
Toluene	26.01	7.01	8.17	2.19
N_2O	0.45	0.29	0.75	0.25

APPENDIX D

COMPUTER PRINTOUTS OF THE REGULATED EMISSIONS TEST RESULTS

TABLE D-1. TEST NO. 011 EMISSION RESULTS

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                              FTP    VEHICLE EMISSIONS RESULTS
                                      PROJECT 11-5830-007

TEST NO.   011FTP   RUN   1                VEHICLE NO.01                     TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    78 BUICK REGAL            DATE    1/20/81                   ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                 BAG CART NO.  1                   GASOLINE  EM-344-F
TRANSMISSION A3                            DYNO NO.      3                   ODOMETER 89222. KM(55440. MILES)
                                           CVS NO.   2

BAROMETER 739.39 MM HG(29.11 IN HG)        DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  37. PCT                 ABS. HUMIDITY  5.9 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .86
BAG RESULTS
  BAG NUMBER                                    1                  2                  3                  4
  DESCRIPTION                            COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)           749.3 (29.5)       762.0 (30.0)       749.3 (29.5)       759.5 (29.9)
  BLOWER INLET P MM. H2O(IN. H2O)         736.6 (29.0)       749.3 (29.5)       736.6 (29.0)       744.2 (29.3)
  BLOWER INLET TEMP. DEG. C(DEG. F)        41.7 (107.0)       39.4 (103.0)       41.7 (107.0)       40.0 (104.0)
  BLOWER REVOLUTIONS                         40526.             69596.             40555.             69566.
  TOT FLOW STD. CU. METRES(SCF)           76.2 ( 2691.)      131.2 ( 4632.)      76.3 ( 2693.)      131.1 ( 4628.)
  HC   SAMPLE METER/RANGE/PPM             29.3/ 3/ 293.      10.1/ 3/ 101.      88.4/ 2/  88.      56.0/ 2/  56.
  HC   BCKGRD METER/RANGE/PPM              1.2/ 3/  12.       1.3/ 3/  13.      11.3/ 2/  11.      11.3/ 2/  11.
  CO   SAMPLE METER/RANGE/PPM             62.0/ 2/3190.      99.3/11/ 436.      97.5/12/ 247.      72.0/12/ 167.
  CO   BCKGRD METER/RANGE/PPM               .2/ 2/   0.       3.1/11/   9.       2.2/12/   4.       1.7/12/   3.
  CO2  SAMPLE METER/RANGE/PCT             71.9/ 3/ 1.30      49.5/ 3/  .84      67.0/ 3/ 1.22      49.2/ 3/  .85
  CO2  BCKGRD METER/RANGE/PCT              3.5/ 3/  .05       3.8/ 3/  .06       2.8/ 3/  .04       2.9/ 3/  .04
  NOX  SAMPLE METER/RANGE/PPM             50.6/ 2/  51.      22.7/ 2/  23.      53.1/ 2/  53.      26.7/ 2/  27.
  NOX  BCKGRD METER/RANGE/PPM               .4/ 2/   0.        .7/ 2/   1.        .8/ 2/   1.        .6/ 2/   1.
  DILUTION FACTOR                              8.17              14.73              10.70              15.34
  HC   CONCENTRATION PPM                       282.               89.                78.                45.
  CO   CONCENTRATION PPM                      3065.              415.               235.               160.
  CO2  CONCENTRATION PCT                       1.26               .80               1.18               .81
  NOX  CONCENTRATION PPM                       50.2               22.0               52.4               26.0
  HC   MASS GRAMS                             12.41               6.72               3.44               3.43
  CO   MASS GRAMS                            271.97              63.35              20.03              24.36
  CO2  MASS GRAMS                            1752.2             1920.9             1640.4             1944.2
  NOX  MASS GRAMS                              6.32               4.77               6.59               5.61

  HC   GRAMS/KM                                2.12               1.07                .59                .54
  CO   GRAMS/KM                               46.39              10.09               3.56               3.85
  CO2  GRAMS/KM                               298.9              307.3              281.7              307.0
  NOX  GRAMS/KM                                1.08                .76               1.13                .89
  FUEL CONSUMPTION BY CB L/100KM              16.16              13.94              12.34              13.44

  RUN TIME              SECONDS                504.               867.               505.               868.
  MEASURED DISTANCE     KM                     5.86               6.20               5.85               6.33
        DFC, WET (DRY)                               .912 ( .901)                          .924 ( .913)
        SCF, WET (DRY)                              1.000 ( .979)                         1.000 ( .979)
        VOL (SCM)                                          207.4                                 207.3
        SAM BLR (SCM)                                       0.00                                  0.00
        KM  (MEASURED)                                     12.14                                 12.18
        FUEL CONSUMPTION L/100KM                           15.01                                 12.91

COMPOSITE RESULTS                                                                              3-BAG      (4-BAG)
  TEST NUMBER            011FTP                            CARBON DIOXIDE       G/KM           298.5     ( 293.5)
  BAROMETER     MM HG    739.4                             FUEL CONSUMPTION     L/100KM        13.96     ( 13.01)
  HUMIDITY      G/KG       5.9                             HYDROCARBONS (THC)   G/KM            1.16     (  1.00)
  TEMPERATURE   DEG C     21.1                             CARBON MONOXIDE      G/KM           15.63     ( 13.99)
                                                           OXIDES OF NITROGEN   G/KM             .73     (   .96)
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                              FET    VEHICLE EMISSIONS RESULTS
                                      PROJECT 11-5830-007

TEST NO.   011FET   RUN   1                VEHICLE NO.01                     TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    78 BUICK REGAL            DATE    1/20/81                   ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                 BAG CART NO.  1                   GASOLINE  EM-344-F
TRANSMISSION A3                            DYNO NO.      3                   ODOMETER 89246. KM(55455. MILES)
                                           CVS NO.   2

BAROMETER 739.14 MM HG(29.10 IN HG)        DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  37. PCT                 ABS. HUMIDITY  5.9 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .86
BAG RESULTS
  TEST CYCLE                                 FET

  BLOWER DIF P MM. H2O(IN. H2O)           759.5 (29.9)
  BLOWER INLET P MM. H2O(IN. H2O)         744.2 (29.3)
  BLOWER INLET TEMP. DEG. C(DEG. F)        41.1 (106.0)
  BLOWER REVOLUTIONS                         61352.
  TOT FLOW STD. CU. METRES(SCF)          115.3 ( 4071.)
  HC   SAMPLE METER/RANGE/PPM             54.3/ 2/  54.
  HC   BCKGRD METER/RANGE/PPM             10.3/ 2/  10.
  CO   SAMPLE METER/RANGE/PPM             94.0/13/  95.
  CO   BCKGRD METER/RANGE/PPM              2.1/13/   2.
  CO2  SAMPLE METER/RANGE/PCT             96.4/ 3/ 1.81
  CO2  BCKGRD METER/RANGE/PCT              3.6/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM             80.8/ 2/  81.
  NOX  BCKGRD METER/RANGE/PPM               .7/ 2/   1.
  DILUTION FACTOR                              7.33
  HC   CONCENTRATION PPM                        45.
  CO   CONCENTRATION PPM                        89.
  CO2  CONCENTRATION PCT                       1.77
  NOX  CONCENTRATION PPM                       80.2
  HC   MASS GRAMS                              3.02
  CO   MASS GRAMS                             11.96
  CO2  MASS GRAMS                            3725.8
  NOX  MASS GRAMS                             15.26
  RUN TIME                  SECONDS            765.
        DFC, WET (DRY)                    .864 ( .853)
        SCF, WET (DRY)                   1.000 ( .971)
        VOL (SCM)                             115.3
        SAM BLR (SCM)                          0.00
        KM  (MEASURED)                        16.54

  TEST NUMBER,                               011FET
  BAROMETER,                MM HG             739.1
  HUMIDITY,                 G/KG                5.9
  TEMPERATURE,              DEG C              21.1
   CARBON DIOXIDE,           G/KM             225.3
  FUEL CONSUMPTION,         L/100KM            9.69

  HYDROCARBONS,             G/KM                .18
  CARBON MONOXIDE,          G/KM                .72
  OXIDES OF NITROGEN,       G/KM                .92
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TABLE D-2. TEST NO. 012 EMISSION RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5830-007

TEST NO.   012FTP   RUN   1                VEHICLE NO.01                       TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 BUICK REGAL             DATE     1/22/81                    ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                 BAG CART NO.  1                     GASOLINE  EM-344
TRANSMISSION A3                            DYNO NO.      3                     ODOMETER 87838. KM(54580. MILES)
                                           CVS NO.   2

BAROMETER 749.05 MM HG(29.49 IN HG)        DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  33. PCT                 ABS. HUMIDITY  5.2 GM/KG            NOX HUMIDITY CORRECTION FACTOR   .85
BAG RESULTS
  BAG NUMBER                                    1                 2                  3                  4
  DESCRIPTION                              COLD TRANSIENT     STABILIZED        HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)            759.5 (29.9)       764.5 (30.1)       767.1 (30.2)       764.5 (30.1)
  BLOWER INLET P MM. H2O(IN. H2O)          741.7 (29.2)       759.5 (29.9)       754.4 (29.7)       754.4 (29.7)
  BLOWER INLET TEMP. DEG. C(DEG. F)         42.2 (108.0)       39.4 (103.0)       38.3 (101.0)       40.0 (104.0)
  BLOWER REVOLUTIONS                          40620.             69585.             40547.             69521.
  TOT FLOW STD. CU. METRES(SCF)             77.3 ( 2731.)     132.9 ( 4692.)      77.6 ( 2741.)     132.7 ( 4685.)
  HC   SAMPLE METER/RANGE/PPM              25.8/ 3/ 258.      82.6/ 2/  83.      71.8/ 2/  72.      43.1/ 2/  43.
  HC   BCKGRD METER/RANGE/PPM               1.4/ 3/  14.      14.8/ 2/  15.      14.1/ 2/  14.      12.5/ 2/  13.
  CO   SAMPLE METER/RANGE/PPM              98.5/ 3/2878.      70.5/11/ 298.      82.0/12/ 193.      47.9/12/ 101.
  CO   BCKGRD METER/RANGE/PPM                .4/ 3/   9.       2.9/11/   8.       3.3/12/   6.       2.7/12/   5.
  CO2  SAMPLE METER/RANGE/PCT              72.2/ 3/ 1.31      49.3/ 3/  .85      67.1/ 3/ 1.21      49.2/ 3/  .85
  CO2  BCKGRD METER/RANGE/PCT               3.6/ 3/  .06       3.7/ 3/  .06       3.7/ 3/  .06       4.0/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM              55.2/ 2/  55.      23.0/ 2/  23.      52.6/ 2/  53.      26.7/ 2/  27.
  NOX  BCKGRD METER/RANGE/PPM                .6/ 2/   1.        .6/ 2/   1.        .6/ 2/   1.        .6/ 2/   1.
  DILUTION FACTOR                              8.31               15.04              10.88              15.48
  HC   CONCENTRATION PPM                       246.               69.                59.                31.
  CO   CONCENTRATION PPM                      2767.              282.               183.                93.
  CO2  CONCENTRATION PCT                      1.26               .80                1.15                .79
  NOX  CONCENTRATION PPM                      54.7               22.4               52.1               26.1
  HC   MASS GRAMS                            10.96               5.27               2.64               2.40
  CO   MASS GRAMS                           249.10              43.62              16.55              14.42
  CO2  MASS GRAMS                           1784.7             1947.9             1639.9             1929.5
  NOX  MASS GRAMS                             6.84               4.83               6.54               5.61

  HC   GRAMS/KM                               1.88                .84                .46                .38
  CO   GRAMS/KM                              42.75               6.98               2.86               2.31
  CO2  GRAMS/KM                              306.3              311.7              283.2              309.1
  NOX  GRAMS/KM                               1.17                .77               1.13                .90
  FUEL CONSUMPTION BY CB L/100KM             16.19              13.89              12.34              13.40

  RUN TIME              SECONDS               506.               867.               506.               867.
  MEASURED DISTANCE     KM                    5.83               6.25               5.79               6.24
        DFC, WET (DRY)                                .914 ( .904)                         .925 ( .915)
        SCF, WET (DRY)                               1.000 ( .980)                        1.000 ( .980)
        VOL (SCM)                                           210.2                                210.3
        SAM BLR (SCM)                                        0.00                                 0.00
        KM  (MEASURED)                                      12.08                                12.03
        FUEL CONSUMPTION L/100KM                            15.00                                12.89

COMPOSITE RESULTS                                                                            3-BAG       (4-BAG)
  TEST NUMBER          012FTP                                 CARBON DIOXIDE       G/KM      302.8      ( 302.0)
  BAROMETER     MM HG  749.0                                  FUEL CONSUMPTION     L/100KM   13.94      ( 13.80)
  HUMIDITY      G/KG     5.2                                  HYDROCARBONS (THC)   G/KM        .95      (   .82)
  TEMPERATURE   DEG C   21.1                                  CARBON MONOXIDE      G/KM      13.27      ( 11.89)
                                                              OXIDES OF NITROGEN   G/KM        .95      (   .99)


                                   FET    VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5830-007

TEST NO.   012FET   RUN   1                VEHICLE NO.01                       TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 BUICK REGAL             DATE     1/22/81                    ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                 BAG CART NO.  1                     GASOLINE  EM-344
TRANSMISSION A3                            DYNO NO.      3                     ODOMETER 87862. KM(54595. MILES)
                                           CVS NO.   2

BAROMETER 749.05 MM HG(29.49 IN HG)        DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
RELATIVE HUMIDITY  29. PCT                 ABS. HUMIDITY  5.1 GM/KG            NOX HUMIDITY CORRECTION FACTOR   .84
BAG RESULTS
  TEST CYCLE                                    FET

  BLOWER DIF P MM. H2O(IN. H2O)            772.2 (30.4)
  BLOWER INLET P MM. H2O(IN. H2O)          756.9 (29.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)         42.2 (108.0)
  BLOWER REVOLUTIONS                          61322.
  TOT FLOW STD. CU. METRES(SCF)            116.5 ( 4113.)
  HC   SAMPLE METER/RANGE/PPM              55.1/ 2/  55.
  HC   BCKGRD METER/RANGE/PPM              12.0/ 2/  12.
  CO   SAMPLE METER/RANGE/PPM              81.3/13/  81.
  CO   BCKGRD METER/RANGE/PPM               3.1/13/   3.
  CO2  SAMPLE METER/RANGE/PCT              93.8/ 3/ 1.76
  CO2  BCKGRD METER/RANGE/PCT               4.2/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM              75.4/ 2/  75.
  NOX  BCKGRD METER/RANGE/PPM                .8/ 2/   1.
  DILUTION FACTOR                              7.57
  HC   CONCENTRATION PPM                       45.
  CO   CONCENTRATION PPM                       75.
  CO2  CONCENTRATION PCT                      1.70
  NOX  CONCENTRATION PPM                      74.7
  HC   MASS GRAMS                             3.00
  CO   MASS GRAMS                            10.14
  CO2  MASS GRAMS                           3629.9
  NOX  MASS GRAMS                            14.03
  RUN TIME                SECONDS             765.
        DFC, WET (DRY)                     .860 ( .840)
        SCF, WET (DRY)                     1[illegible] ( .974)
        VOL (SCM)                            116.5
        SAM BLR (SCM)                         0.00
        KM  (MEASURED)                       16.42

  TEST NUMBER,                               012FET
  BAROMETER,              MM HG              749.0
  HUMIDITY,               G/KG                 5.1
  TEMPERATURE,            DEG C               22.8
   CARBON DIOXIDE,         G/KM              221.1
  FUEL CONSUMPTION,       L/100KM             9.50

  HYDROCARBONS,           G/KM                 .18
  CARBON MONOXIDE,        G/KM                 .62
  OXIDES OF NITROGEN,     G/KM                 .85
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TABLE D-3. TEST NO. 021 EMISSIONS RESULTS

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                                     FTP    VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5830-007

TEST NO.   021FTP   RUN   1                  VEHICLE NO.02                      TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   79 MERCURY MARQUIS           DATE    2/ 2/81                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                   BAG CART NO.  1                    GASOLINE  EM-470-F
TRANSMISSION A3                              DYNO NO.      3                    ODOMETER     0. KM(    0. MILES)
                                             CVS NO.   2

BAROMETER 755.14 MM HG(29.73 IN HG)          DRY BULB TEMP. 19.4 DEG C(67.0 DEG F)
RELATIVE HUMIDITY  26. PCT                   ABS. HUMIDITY  3.7 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .81
BAG RESULTS
   BAG NUMBER                                      1                 2                  3                 4
   DESCRIPTION                               COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

    BLOWER DIF P MM. H2O(IN. H2O)            774.7 (30.5)      769.6 (30.3)      769.6 (30.3)      767.1 (30.2)
    BLOWER INLET P MM. H2O(IN. H2O)          767.1 (30.2)      762.0 (30.0)      762.0 (30.0)      762.0 (30.0)
    BLOWER INLET TEMP. DEG. C(DEG. F)         42.2 (108.0)      42.2 (108.0)      42.2 (108.0)      42.2 (108.0)
    BLOWER REVOLUTIONS                          40510.            69609.            40560.            69346.
    TOT FLOW STD. CU. METRES(SCF)             77.6 ( 2739.)    133.4 ( 4709.)     77.7 ( 2744.)    132.9 ( 4691.)
    HC   SAMPLE METER/RANGE/PPM              12.7/ 3/ 127.     31.5/ 2/  32.     53.9/ 2/  54.     32.0/ 2/  32.
    HC   BCKGRD METER/RANGE/PPM                .8/ 3/   8.      7.6/ 2/   8.      8.5/ 2/   9.      8.4/ 2/   8.
    CO   SAMPLE METER/RANGE/PPM              33.5/ 3/ 839.     22.6/13/  21.     77.4/12/ 181.     26.5/13/  24.
    CO   BCKGRD METER/RANGE/PPM                .1/ 3/   2.       .8/13/   1.       .1/12/   0.       .5/13/   0.
    CO2  SAMPLE METER/RANGE/PCT              88.5/ 3/ 1.63     60.5/ 3/ 1.07     79.4/ 3/ 1.46     59.9/ 3/ 1.06
    CO2  BCKGRD METER/RANGE/PCT               3.2/ 3/  .05      3.1/ 3/  .05      3.4/ 3/  .05      3.2/ 3/  .05
    NOX  SAMPLE METER/RANGE/PPM              97.3/ 2/  97.     34.9/ 2/  35.     74.2/ 2/  74.     36.2/ 2/  36.
    NOX  BCKGRD METER/RANGE/PPM                .2/ 2/   0.       .4/ 2/   0.       .4/ 2/   0.       .5/ 2/   1.
    DILUTION FACTOR                              7.70             12.43              9.05             12.56
    HC   CONCENTRATION PPM                       120.               25.               46.               24.
    CO   CONCENTRATION PPM                       803.               19.              174.               23.
    CO2  CONCENTRATION PCT                       1.60              1.03              1.41              1.02
    NOX  CONCENTRATION PPM                       97.1              34.5              73.8              35.7
    HC   MASS GRAMS                              5.37              1.88              2.08              1.86
    CO   MASS GRAMS                             72.52              3.01             15.77              3.58
    CO2  MASS GRAMS                            2277.9            2513.1            2007.3            2471.1
    NOX  MASS GRAMS                             11.71              7.14              8.92              7.38

    HC   GRAMS/KM                                 .92               .30               .35               .29
    CO   GRAMS/KM                               12.44               .48              2.69               .57
    CO2  GRAMS/KM                               390.7             399.0             342.6             391.8
    NOX  GRAMS/KM                                2.01              1.14              1.52              1.17
    FUEL CONSUMPTION BY CB L/100KM              17.64             17.10             14.85             16.80

    RUN TIME              SECONDS                504.              868.              506.              865.
    MEASURED DISTANCE     KM                     5.83              6.30              5.86              6.31
         DFC, WET (DRY)                              .901 ( .894)                         .909 ( .901)
         SCF, WET (DRY)                             1.000 ( .980)                        1.000 ( .980)
         VOL (SCM)                                        210.9                                210.6
         SAM BLR (SCM)                                     0.00                                 0.00
         KM  (MEASURED)                                   12.13                                12.17
         FUEL CONSUMPTION L/100KM                         17.36                                15.86

COMPOSITE RESULTS                                                                              3-BAG      (4-BAG)
   TEST NUMBER          021FTP                                    CARBON DIOXIDE       G/KM    381.8      ( 379.7)
   BAROMETER     MM HG  755.1                                     FUEL CONSUMPTION     L/100KM  16.59     ( 16.50)
   HUMIDITY      G/KG     3.7                                     HYDROCARBONS (THC)   G/KM       .44     (   .44)
   TEMPERATURE   DEG C   19.4                                     CARBON MONOXIDE      G/KM      3.56     (  3.50)
                                                                  OXIDES OF NITROGEN   G/KM      1.42     (  1.43)
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                                     HFET   VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5830-007

TEST NO.   021FET   RUN   1                  VEHICLE NO.02                      TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   79 MERCURY MARQUIS           DATE    2/ 2/81                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                   BAG CART NO.  1                    GASOLINE  EM-470-F
TRANSMISSION A3                              DYNO NO.      3                    ODOMETER     0. KM(    0. MILES)
                                             CVS NO.   2

BAROMETER 755.40 MM HG(29.74 IN HG)          DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
RELATIVE HUMIDITY  25. PCT                   ABS. HUMIDITY  4.1 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .82
0 BAG RESULTS
   TEST CYCLE                                      HFET

    BLOWER DIF P MM. H2O(IN. H2O)            787.4 (31.0)
    BLOWER INLET P MM. H2O(IN. H2O)          767.1 (30.2)
    BLOWER INLET TEMP. DEG. C(DEG. F)         42.2 (108.0)
    BLOWER REVOLUTIONS                          61345.
    TOT FLOW STD. CU. METRES(SCF)            117.4 ( 4146.)
    HC   SAMPLE METER/RANGE/PPM              46.6/ 2/  47.
    HC   BCKGRD METER/RANGE/PPM               8.2/ 2/   8.
    CO   SAMPLE METER/RANGE/PPM              38.9/13/  36.
    CO   BCKGRD METER/RANGE/PPM                .7/13/   1.
    CO2  SAMPLE METER/RANGE/PCT              45.5/ 2/ 2.00
    CO2  BCKGRD METER/RANGE/PCT               1.5/ 2/  .05
    NOX  SAMPLE METER/RANGE/PPM              34.7/ 3/ 110.
    NOX  BCKGRD METER/RANGE/PPM                .2/ 3/   1.
    DILUTION FACTOR                              6.68
    HC   CONCENTRATION PPM                        40.
    CO   CONCENTRATION PPM                        34.
    CO2  CONCENTRATION PCT                       1.95
    NOX  CONCENTRATION PPM                      109.6
    HC   MASS GRAMS                              2.68
    CO   MASS GRAMS                              4.64
    CO2  MASS GRAMS                            4198.3
    NOX  MASS GRAMS                             20.23
    RUN TIME              SECONDS                766.
         DFC, WET (DRY)                       .850 ( .844)
         SCF, WET (DRY)                      1.000 ( .974)
         VOL (SCM)                                117.4
         SAM BLR (SCM)                             0.00
         KM  (MEASURED)                           16.58

    TEST NUMBER.                                021FET
    BAROMETER.              MM HG                755.4
    HUMIDITY.               G/KG                   4.1
    TEMPERATURE.            DEG C                 22.2
     CARBON DIOXIDE.         G/KM                253.3
    FUEL CONSUMPTION.       L/100KM              10.85

    HYDROCARBONS.           G/KM                   .16
    CARBON MONOXIDE.        G/KM                   .28
    OXIDES OF NITROGEN.     G/KM                  1.22
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TABLE D-4. TEST NO. 022 EMISSIONS RESULTS

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                                 FTP    VEHICLE EMISSIONS RESULTS
                                          PROJECT 11-5830-007

TEST NO.    022FTP   RUN   1                 VEHICLE NO.02                        TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS          DATE     2/ 3/81                     ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                   BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                              DYNO NO.      3                      ODOMETER      0. KM(     0. MILES)
                                             CVS NO.   2

BAROMETER 753.87 MM HG(29.68 IN HG)          DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  23. PCT                   ABS. HUMIDITY  3.5 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .81
BAG RESULTS
   BAG NUMBER                                      1                    2                    3                    4
   DESCRIPTION                               COLD TRANSIENT        STABILIZED        HOT TRANSIENT         STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)             782.3 (30.8)        774.7 (30.5)        774.7 (30.5)        772.2 (30.4)
   BLOWER INLET P MM. H2O(IN. H2O)           769.6 (30.3)        764.5 (30.1)        762.0 (30.0)        762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)          42.2 (108.0)        42.2 (108.0)        42.2 (108.0)        42.2 (108.0)
   BLOWER REVOLUTIONS                           40562.              69607.              40562.              69369.
   TOT FLOW STD. CU. METRES(SCF)              77.5 ( 2736.)      133.1 ( 4698.)       77.6 ( 2738.)      133.0 ( 4697.)
   HC   SAMPLE METER/RANGE/PPM               12.7/ 3/ 127.       33.7/ 2/  34.       50.7/ 2/  51.       33.3/ 2/  33.
   HC   BCKGRD METER/RANGE/PPM                1.1/ 3/  11.       10.7/ 2/  11.       10.1/ 2/  10.       10.4/ 2/  10.
   CO   SAMPLE METER/RANGE/PPM               34.0/ 3/ 851.       30.1/13/  28.       43.1/12/ 140.       33.5/13/  31.
   CO   BCKGRD METER/RANGE/PPM                 .4/ 3/   9.        8.7/13/   8.        1.9/12/   4.        3.9/13/   4.
   CO2  SAMPLE METER/RANGE/PCT               89.7/ 3/ 1.67       61.0/ 3/ 1.08       80.2/ 3/ 1.47       60.3/ 3/ 1.07
   CO2  BCKGRD METER/RANGE/PCT                3.7/ 3/  .06        3.2/ 3/  .05        3.3/ 3/  .05        3.7/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM               98.1/ 2/  98.       36.3/ 2/  36.       74.9/ 2/  75.       34.8/ 2/  35.
   NOX  BCKGRD METER/RANGE/PPM                 .5/ 2/   1.         .6/ 2/   1.         .1/ 2/   0.         .1/ 2/   0.
   DILUTION FACTOR                                7.39                12.31                8.90                12.46
   HC   CONCENTRATION PPM                       117.                  24.                 42.                  24.
   CO   CONCENTRATION PPM                       810.                  20.                132.                  27.
   CO2  CONCENTRATION PCT                       1.62                 1.04                1.43                 1.02
   NOX  CONCENTRATION PPM                       97.7                 35.7                74.8                 34.7
   HC   MASS GRAMS                               5.25                 1.83                1.87                 1.82
   CO   MASS GRAMS                              73.06                 3.06               11.90                 4.16
   CO2  MASS GRAMS                            2301.6               2528.1              2025.0               2476.2
   NOX  MASS GRAMS                              11.71                 7.36                8.90                 7.14

   HC   GRAMS/KM                                  .90                  .29                 .32                  .29
   CO   GRAMS/KM                                12.50                  .48                2.03                  .66
   CO2  GRAMS/KM                                393.8                400.7               345.6                391.7
   NOX  GRAMS/KM                                 2.00                 1.17                1.53                 1.13
   FUEL CONSUMPTION BY CB L/100KM               17.77                17.18               14.93                16.80

   RUN TIME            SECONDS                  503.                 868.                506.                 868.
   MEASURED DISTANCE   KM                       5.85                 6.31                5.86                 6.32
        DFC, WET (DRY)                                  .900 ( .894)                .908 ( .902)
        SCF, WET (DRY)                                 1.000 ( .981)               1.000 ( .981)
        VOL (SCM)                                             210.5                       210.6
        SAM BLR (SCM)                                          0.00                        0.00
        KM  (MEASURED)                                        12.15                       12.18
        FUEL CONSUMPTION L/100KM                              17.46                       15.90

COMPOSITE RESULTS
   TEST NUMBER              022FTP                                                          3-BAG       (4-BAG)
   BAROMETER     MM HG      753.9             CARBON DIOXIDE          G/KM                  384.2      ( 381.5)
   HUMIDITY      G/KG         3.5             FUEL CONSUMPTION        L/100KM               16.68      ( 16.57)
   TEMPERATURE   DEG C       21.1             HYDROCARBONS (THC)      G/KM                    .42      (   .42)
                                              CARBON MONOXIDE         G/KM                   3.39      (  3.44)
                                              OXIDES OF NITROGEN      G/KM                   1.44      (  1.43)
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                                 FET    VEHICLE EMISSIONS RESULTS
                                          PROJECT 11-5830-007

TEST NO.    022FET   RUN   1                 VEHICLE NO.02                        TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS          DATE     2/ 3/81                     ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                   BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                              DYNO NO.      3                      ODOMETER      0. KM(     0. MILES)
                                             CVS NO.   2

BAROMETER 754.13 MM HG(29.69 IN HG)          DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
RELATIVE HUMIDITY  20. PCT                   ABS. HUMIDITY  3.4 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .81
0 BAG RESULTS
   TEST CYCLE                                     FET

   BLOWER DIF P MM. H2O(IN. H2O)             792.5 (31.2)
   BLOWER INLET P MM. H2O(IN. H2O)           769.6 (30.3)
   BLOWER INLET TEMP. DEG. C(DEG. F)          42.2 (108.0)
   BLOWER REVOLUTIONS                           61283.
   TOT FLOW STD. CU. METRES(SCF)             117.0 ( 4133.)
   HC   SAMPLE METER/RANGE/PPM               46.8/ 2/  47.
   HC   BCKGRD METER/RANGE/PPM               11.2/ 2/  11.
   CO   SAMPLE METER/RANGE/PPM               42.5/13/  40.
   CO   BCKGRD METER/RANGE/PPM                2.4/13/   2.
   CO2  SAMPLE METER/RANGE/PCT               45.3/ 2/ 1.99
   CO2  BCKGRD METER/RANGE/PCT                1.7/ 2/  .06
   NOX  SAMPLE METER/RANGE/PPM               40.4/ 3/ 121.
   NOX  BCKGRD METER/RANGE/PPM                 .1/ 3/   0.
   DILUTION FACTOR                                6.71
   HC   CONCENTRATION PPM                        37.
   CO   CONCENTRATION PPM                        36.
   CO2  CONCENTRATION PCT                       1.94
   NOX  CONCENTRATION PPM                      120.9
   HC   MASS GRAMS                               2.52
   CO   MASS GRAMS                               4.92
   CO2  MASS GRAMS                             4148.8
   NOX  MASS GRAMS                              21.81
   RUN TIME                 SECONDS             765.
        DFC, WET (DRY)                      .851 ( .846)
        SCF, WET (DRY)                     1.000 ( .975)
        VOL (SCM)                                117.0
        SAM BLR (SCM)                             0.00
        KM  (MEASURED)                           16.57

   TEST NUMBER,                                 022FET
   BAROMETER,              MM HG                754.1
   HUMIDITY,               G/KG                   3.4
   TEMPERATURE,            DEG C                 22.8
    CARBON DIOXIDE,         G/KM                250.3
   FUEL CONSUMPTION,       L/100KM              10.73

   HYDROCARBONS,           G/KM                   .15
   CARBON MONOXIDE,        G/KM                   .30
   OXIDES OF NITROGEN,     G/KM                  1.32
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TABLE D-5. TEST NO. 031 EMISSIONS RESULTS

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                                    FTP    VEHICLE EMISSIONS RESULTS
                                             PROJECT 11-5830-007

TEST NO.   031FTP   RUN   1                 VEHICLE NO.03                          TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS         DATE    2/ 9/81                        ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                  BAG CART NO.  1                        GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                        ODOMETER 78476. KM(48763. MILES)
                                            CVS NO.   2

BAROMETER 737.87 MM HG(29.05 IN HG)         DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  48. PCT                  ABS. HUMIDITY  7.7 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .91
BAG RESULTS
   BAG NUMBER                                     1                   2                   3                   4
   DESCRIPTION                              COLD TRANSIENT        STABILIZED        HOT TRANSIENT         STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)       762.0 (30.0)       762.0 (30.0)       762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)           754.4 (29.7)       754.4 (29.7)       754.4 (29.7)       754.4 (29.7)
   BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)       42.2 (108.0)       42.2 (108.0)       42.2 (108.0)
   BLOWER REVOLUTIONS                           40598.             69550.             40564.             69510.
   TOT FLOW STD. CU. METRES(SCF)              75.8 ( 2678.)     130.0 ( 4592.)      75.8 ( 2678.)     130.0 ( 4589.)
   HC   SAMPLE METER/RANGE/PPM               12.8/ 3/ 128.      43.1/ 2/  43.      64.5/ 2/  65.      33.0/ 2/  33.
   HC   BCKGRD METER/RANGE/PPM                1.5/ 3/  15.      18.6/ 2/  19.      14.9/ 2/  15.      13.2/ 2/  13.
   CO   SAMPLE METER/RANGE/PPM               27.8/ 3/ 647.      80.3/13/  80.      95.4/12/ 240.      74.3/12/ 172.
   CO   BCKGRD METER/RANGE/PPM                 .6/ 3/  14.      12.9/13/  12.       2.5/12/   5.       2.0/12/   4.
   CO2  SAMPLE METER/RANGE/PCT               92.1/ 3/ 1.72      65.2/ 3/ 1.17      84.7/ 3/ 1.57      65.3/ 3/ 1.17
   CO2  BCKGRD METER/RANGE/PCT                3.2/ 3/  .05       3.8/ 3/  .06       4.3/ 3/  .07       3.6/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM               68.7/ 2/  69.      21.4/ 2/  21.      43.0/ 2/  43.      23.0/ 2/  23.
   NOX  BCKGRD METER/RANGE/PPM                 .5/ 2/   1.        .5/ 2/   1.        .5/ 2/   1.        .6/ 2/   1.
   DILUTION FACTOR                                 7.46              11.37               8.39              11.27
   HC   CONCENTRATION PPM                         115.                26.                51.                21.
   CO   CONCENTRATION PPM                         604.                66.               225.               162.
   CO2  CONCENTRATION PCT                         1.68               1.11               1.51               1.12
   NOX  CONCENTRATION PPM                         68.3               20.9               42.6               22.5
   HC   MASS GRAMS                                 5.03               1.96               2.25               1.57
   CO   MASS GRAMS                                53.34               9.99              19.84              24.49
   CO2  MASS GRAMS                              2332.4             2651.8             2095.7             2661.9
   NOX  MASS GRAMS                                 9.02               4.75               5.42               5.08

   HC   GRAMS/KM                                    .87                .31                .38                .25
   CO   GRAMS/KM                                   9.23               1.59               3.40               3.89
   CO2  GRAMS/KM                                  403.6              421.7              358.7              422.3
   NOX  GRAMS/KM                                   1.56                .75                .96                .81
   FUEL CONSUMPTION BY CB L/100KM                 17.96              18.15              15.59              18.32

   RUN TIME                 SECONDS          505.               867.               505.               846.
   MEASURED DISTANCE        KM               5.78               6.29               5.84               6.30
          DFC, WET (DRY)                              .895 ( .881)                          .900 ( .886)
          SCF, WET (DRY)                             1.000 ( .972)                         1.000 ( .972)
          VOL (SCM)                                         205.9                                 205.8
          SAM BLR (SCM)                                      0.00                                  0.00
          KM  (MEASURED)                                    12.07                                 12.15
          FUEL CONSUMPTION L/100KM                          18.06                                 17.01

COMPOSITE RESULTS
   TEST NUMBER            031FTP                                                          3-BAG       (4-BAG)
   BAROMETER      MM HG   737.9                       CARBON DIOXIDE        G/KM          400.7      ( 400.9)
   HUMIDITY       G/KG      7.7                       FUEL CONSUMPTION      L/100KM       17.41      ( 17.46)
   TEMPERATURE    DEG C    21.1                       HYDROCARBONS (THC)    G/KM            .45      (   .43)
                                                      CARBON MONOXIDE       G/KM           3.66      (  4.34)
                                                      OXIDES OF NITROGEN    G/KM            .98      (   .99)
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                                    HFET   VEHICLE EMISSIONS RESULTS
                                             PROJECT 11-5830-007

TEST NO.   031FET   RUN   1                 VEHICLE NO.03.                         TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS         DATE    2/ 9/81                        ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                  BAG CART NO.  1                        GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                        ODOMETER 78499. KM(48777. MILES)
                                            CVS NO.   2

BAROMETER 736.60 MM HG(29.00 IN HG)         DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
RELATIVE HUMIDITY  50. PCT                  ABS. HUMIDITY  8.6 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .93
0 BAG RESULTS
   TEST CYCLE                                      HFET

   BLOWER DIF P MM. H2O(IN. H2O)             774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)           764.5 (30.1)
   BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)
   BLOWER REVOLUTIONS                           61374.
   TOT FLOW STD. CU. METRES(SCF)             114.2 ( 4034.)
   HC   SAMPLE METER/RANGE/PPM               47.9/ 2/  48.
   HC   BCKGRD METER/RANGE/PPM               12.9/ 2/  13.
   CO   SAMPLE METER/RANGE/PPM               73.0/12/ 168.
   CO   BCKGRD METER/RANGE/PPM                1.3/12/   2.
   CO2  SAMPLE METER/RANGE/PCT               46.6/ 2/ 2.06
   CO2  BCKGRD METER/RANGE/PCT                1.6/ 2/  .06
   NOX  SAMPLE METER/RANGE/PPM               40.0/ 3/ 120.
   NOX  BCKGRD METER/RANGE/PPM                 .1/ 3/   0.
   DILUTION FACTOR                                 6.45
   HC   CONCENTRATION PPM                          37.
   CO   CONCENTRATION PPM                         157.
   CO2  CONCENTRATION PCT                         2.01
   NOX  CONCENTRATION PPM                        119.7
   HC   MASS GRAMS                                 2.44
   CO   MASS GRAMS                                20.82
   CO2  MASS GRAMS                              4200.2
   NOX  MASS GRAMS                                24.43
   RUN TIME                 SECONDS               765.
          DFC, WET (DRY)                     .845 ( .831)
          SCF, WET (DRY)                    1.000 ( .965)
          VOL (SCM)                                114.2
          SAM BLR (SCM)                             0.00
          KM  (MEASURED)                           16.42

   TEST NUMBER,                                  031FET
   BAROMETER,               MM HG                 736.6
   HUMIDITY,                G/KG                    8.6
   TEMPERATURE,             DEG C                  22.2
    CARBON DIOXIDE,          G/KM                 255.8
   FUEL CONSUMPTION,        L/100KM               11.02

   HYDROCARBONS,            G/KM                    .15
   CARBON MONOXIDE,         G/KM                   1.27
   OXIDES OF NITROGEN,      G/KM                   1.49
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TABLE D-6. TEST NO. 032 EMISSIONS RESULTS

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                          FTP    VEHICLE EMISSIONS RESULTS
                                   PROJECT 11-5830-007

TEST NO.   032FTP   RUN   1              VEHICLE NO.03                        TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   79 MERCURY MARQUIS       DATE    2/10/81                      ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8               BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                          DYNO NO.      3                      ODOMETER 78534. KM(48799. MILES)
                                         CVS NO.   2

BAROMETER 731.01 MM HG(28.78 IN HG)      DRY BULB TEMP. 20.6 DEG C(69.0 DEG F)
RELATIVE HUMIDITY  52. PCT               ABS. HUMIDITY  8.1 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .92
BAG RESULTS
   BAG NUMBER                                  1                 2                  3                  4
   DESCRIPTION                          COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)         749.3 (29.5)       762.0 (30.0)      769.6 (30.3)       762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)       736.6 (29.0)       741.7 (29.2)      744.2 (29.3)       749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)      34.4 ( 94.0)       41.7 (107.0)      41.7 (107.0)       42.2 (108.0)
   BLOWER REVOLUTIONS                       40500.             69477.            40494.             67549.
   TOT FLOW STD. CU. METRES(SCF)          76.3 ( 2695.)     128.9 ( 4551.)     75.1 ( 2651.)     128.8 ( 4547.)
   HC  SAMPLE METER/RANGE/PPM            11.1/ 3/ 111.      36.3/ 2/  36.     64.7/ 2/  65.      29.9/ 2/  30.
   HC  BCKGRD METER/RANGE/PPM             1.7/ 3/  17.      17.8/ 2/  18.     15.5/ 2/  16.      14.4/ 2/  14.
   CO  SAMPLE METER/RANGE/PPM            25.8/ 3/ 599.      67.7/13/  66.     72.1/11/ 303.      76.8/12/ 179.
   CO  BCKGRD METER/RANGE/PPM              .4/ 3/   9.       5.1/13/   5.      1.1/11/   3.       2.1/12/   4.
   CO2 SAMPLE METER/RANGE/PCT            92.4/ 3/ 1.73      63.7/ 3/ 1.14     34.0/ 3/ 1.55      64.7/ 3/ 1.16
   CO2 BCKGRD METER/RANGE/PCT             3.7/ 3/  .06       3.5/ 3/  .05      3.6/ 3/  .06       4.2/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM            73.0/ 2/  73.      24.6/ 2/  25.     48.3/ 2/  48.      24.3/ 2/  24.
   NOX BCKGRD METER/RANGE/PPM             1.0/ 2/   1.       1.1/ 2/   1.      1.2/ 2/   1.       1.5/ 2/   2.
   DILUTION FACTOR                           7.46              11.68              8.43              11.38
   HC  CONCENTRATION PPM                     96.                20.               51.                17.
   CO  CONCENTRATION PPM                    561.                59.              291.               169.
   CO2 CONCENTRATION PCT                    1.68               1.09              1.50               1.10
   NOX CONCENTRATION PPM                    72.1               23.6              47.2               22.9
   HC  MASS GRAMS                           4.24               1.49              2.21               1.24
   CO  MASS GRAMS                          49.84               8.85             25.44              25.30
   CO2 MASS GRAMS                         2346.4             2566.7            2067.5             2588.9
   NOX MASS GRAMS                           9.69               5.35              6.24               5.20

   HC  GRAMS/KM                              .72                .24               .38                .20
   CO  GRAMS/KM                             8.51               1.41              4.38               4.05
   CO2 GRAMS/KM                            400.7              410.3             356.1              414.3
   NOX GRAMS/KM                             1.65                .86              1.08                .83
   FUEL CONSUMPTION BY CB L/100KM          17.77              17.64             15.55              17.90

   RUN TIME              SECONDS            505.               866.              505.               868.
   MEASURED DISTANCE     KM                 5.86               6.26              5.81               6.25
        DFC, WET (DRY)                             .876 ( .861)                         .901 ( .886)
        SCF, WET (DRY)                            1.000 ( .971)                        1.000 ( .971)
        VOL (SCM)                                       205.2                                203.8
        SAM BLR (SCM)                                    0.00                                 0.00
        KM  (MEASURED)                                  12.11                                12.05
        FUEL CONSUMPTION L/100KM                        17.70                                16.81

COMPOSITE RESULTS                                                                                  3-BAG      (4-BAG)
   TEST NUMBER            032FTP                              CARBON DIOXIDE       G/KM            393.4     ( 394.6)
   BAROMETER      MM HG   731.0                               FUEL CONSUMPTION     L/100KM         17.09     ( 17.19)
   HUMIDITY       G/KG      8.1                               HYDROCARBONS (THC)   G/KM              .38     (   .37)
   TEMPERATURE    DEG C    20.6                               CARBON MONOXIDE      G/KM             3.70     (  4.48)
                                                              OXIDES OF NITROGEN   G/KM             1.08     (  1.08)
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                          FET    VEHICLE EMISSIONS RESULTS
                                   PROJECT 11-5830-007

TEST NO.   032FET   RUN   1              VEHICLE NO.03                        TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   79 MERCURY MAGRUIS       DATE    2/10/81                      ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8               BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                          DYNO NO.      3                      ODOMETER 78559. KM(48814. MILES)
                                         CVS NO.   2

BAROMETER 756.92 MM HG(29.80 IN HG)      DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  41. PCT               ABS. HUMIDITY  7.5 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .91
0 BAG RESULTS
   TEST CYCLE                                 FET

   BLOWER DIF P MM. H2O(IN. H2O)         769.6 (30.3)
   BLOWER INLET P MM. H2O(IN. H2O)       762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)      42.2 (108.0)
   BLOWER REVOLUTIONS                       61383.
   TOT FLOW STD. CU. METRES(SCF)         117.9 ( 4163.)
   HC  SAMPLE METER/RANGE/PPM            54.6/ 2/  55.
   HC  BCKGRD METER/RANGE/PPM            13.8/ 2/  14.
   CO  SAMPLE METER/RANGE/PPM            97.2/12/ 246.
   CO  BCKGRD METER/RANGE/PPM             1.8/12/   3.
   CO2 SAMPLE METER/RANGE/PCT            46.0/ 2/ 2.02
   CO2 BCKGRD METER/RANGE/PCT             1.5/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM            44.3/ 3/ 133.
   NOX BCKGRD METER/RANGE/PPM              .5/ 3/   2.
   DILUTION FACTOR                           6.53
   HC  CONCENTRATION PPM                     43.
   CO  CONCENTRATION PPM                    230.
   CO2 CONCENTRATION PCT                    1.98
   NOX CONCENTRATION PPM                   131.6
   HC  MASS GRAMS                           2.92
   CO  MASS GRAMS                          31.62
   CO2 MASS GRAMS                         4272.6
   NOX MASS GRAMS                          26.87
   RUN TIME               SECONDS           766.
        DFC, WET (DRY)                   .847 ( .836)
        SCF, WET (DRY)                  1.000 ( .968)
        VOL (SCM)                          117.9
        SAM BLR (SCM)                       0.00
        KM  (MEASURED)                     16.56

   TEST NUMBER.                             032FET
   BAROMETER.             MM HG              756.9
   HUMIDITY.              G/KG                 7.5
   TEMPERATURE.           DEG C               23.9
    CARBON DIOXIDE.        G/KM              257.9
   FUEL CONSUMPTION.      L/100KM            11.16

   HYDROCARBONS.          G/KM                 .18
   CARBON MONOXIDE.       G/KM                1.91
   OXIDES OF NITROGEN.    G/KM                1.62
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TABLE D-7. TEST NO. 036 EMISSIONS RESULTS

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                                          FTP    VEHICLE EMISSIONS RESULTS
                                                   PROJECT 11-5830-007

TEST NO.    036FTP    RUN    1                VEHICLE NO.03                      TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS           DATE     2/11/81                   ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                    BAG CART NO.  1                    GASOLINE  EM-470-F
TRANSMISSION A3                               DYNO NO.      3                    ODOMETER 78597. KM(48838. MILES)
                                              CVS NO.   2

BAROMETER 760.22 MM HG(29.93 IN HG)           DRY BULB TEMP. 20.0 DEG C(68.0 DEG F)
RELATIVE HUMIDITY  13. PCT                    ABS. HUMIDITY  1.9 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .78
BAG RESULTS
   BAG NUMBER                                       1                 2                  3                  4
   DESCRIPTION                               COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)              769.6 (30.3)      777.2 (30.6)      774.7 (30.5)      774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)            762.0 (30.0)      767.1 (30.2)      767.1 (30.2)      769.6 (30.3)
   BLOWER INLET TEMP. DEG. C(DEG. F)           42.2 (108.0)      44.4 (112.0)      40.6 (105.0)      40.6 (105.0)
   BLOWER REVOLUTIONS                           40700.            69414.            40483.            69489.
   TOT FLOW STD. CU. METRES(SCF)               78.6 ( 2774.)    133.3 ( 4708.)     78.3 ( 2765.)    134.4 ( 4745.)
   HC   SAMPLE METER/RANGE/PPM                10.7/ 3/ 107.     33.6/ 2/  34.     62.2/ 2/  62.     28.9/ 2/  29.
   HC   BCKGRD METER/RANGE/PPM                 1.0/ 3/  10.     10.6/ 2/  11.     10.4/ 2/  10.     10.3/ 2/  10.
   CO   SAMPLE METER/RANGE/PPM                63.6/11/ 256.     47.9/13/  45.     64.7/12/ 144.     75.9/13/  75.
   CO   BCKGRD METER/RANGE/PPM                 1.7/11/   5.      5.2/13/   5.      1.6/12/   3.      3.3/13/   3.
   CO2  SAMPLE METER/RANGE/PCT                87.7/ 3/ 1.63     60.4/ 3/ 1.07     80.7/ 3/ 1.48     61.4/ 3/ 1.09
   CO2  BCKGRD METER/RANGE/PCT                 4.0/ 3/  .06      4.7/ 3/  .07      4.5/ 3/  .07      4.5/ 3/  .07
   NOX  SAMPLE METER/RANGE/PPM                90.4/ 2/  90.     24.6/ 2/  25.     54.0/ 2/  55.     26.7/ 2/  27.
   NOX  BCKGRD METER/RANGE/PPM                  .8/ 2/   1.       .9/ 2/   1.       .7/ 2/   1.       .7/ 2/   1.
   DILUTION FACTOR                                 8.05             12.42              8.91             12.17
   HC   CONCENTRATION PPM                          98.               24.               53.               19.
   CO   CONCENTRATION PPM                         243.               40.              137.               70.
   CO2  CONCENTRATION PCT                          1.58             1.00              1.42              1.03
   NOX  CONCENTRATION PPM                         89.7              23.8              54.2              26.1
   HC   MASS GRAMS                                 4.45             1.83              2.39              1.51
   CO   MASS GRAMS                                22.22             6.15             12.48             10.95
   CO2  MASS GRAMS                              2267.1            2452.2            2040.0            2527.7
   NOX  MASS GRAMS                                10.45             4.70              6.29              5.19

   HC   GRAMS/KM                                   .77               .29               .42               .24
   CO   GRAMS/KM                                  3.83               .98              2.17              1.77
   CO2  GRAMS/KM                                 390.4             392.3             354.0             407.9
   NOX  GRAMS/KM                                  1.80               .75              1.09               .84
   FUEL CONSUMPTION BY CB L/100KM                17.02             16.85             15.31             17.56

   RUN TIME              SECONDS                 507.              866.              505.              868.
   MEASURED DISTANCE     KM                      5.81              6.25              5.76              6.20
         DFC, WET (DRY)                                  .903 ( .899)                       .907 ( .903)
         SCF, WET (DRY)                                 1.000 ( .984)                      1.000 ( .984)
         VOL (SCM)                                          211.9                              212.7
         SAM BLR (SCM)                                        0.00                               0.00
         KM  (MEASURED)                                      12.06                              11.96
         FUEL CONSUMPTION L/100KM                            16.93                              16.48

COMPOSITE RESULTS
   TEST NUMBER              036FTP                                                                 3-BAG      (4-BAG)
   BAROMETER      MM HG   760.2                      CARBON DIOXIDE          G/KM           381.4     ( 386.0)
   HUMIDITY       G/KG      1.9                      FUEL CONSUMPTION        L/100KM        16.46     ( 16.67)
   TEMPERATURE    DEG C    20.0                      HYDROCARBONS (THC)      G/KM             .42     (   .41)
                                                     CARBON MONOXIDE         G/KM            1.98     (  2.13)
                                                     OXIDES OF NITROGEN      G/KM            1.06     (  1.09)
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                                          HFET   VEHICLE EMISSIONS RESULTS
                                                   PROJECT 11-5830-007

TEST NO.    036FET    RUN    1                VEHICLE NO.03
VEHICLE MODEL    79 MERCURY MAORUIS           DATE     2/11/81                   TEST WEIGHT  2041. KG( 4500. LBS)
ENGINE 5.7 L(351. CID) V-8                    BAG CART NO.  1                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
TRANSMISSION A3                               DYNO NO.      3                    GASOLINE  EM-470-F
                                              CVS NO.   2                        ODOMETER 78620. KM(48852. MILES)

BAROMETER 760.98 MM HG(29.96 IN HG)           DRY BULB TEMP. 22.2 DEG C(72.0 DEG F)
RELATIVE HUMIDITY   9. PCT                    ABS. HUMIDITY  1.5 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .77
0 BAG RESULTS
   TEST CYCLE                                      HFET

   BLOWER DIF P MM. H2O(IN. H2O)              800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)            792.5 (31.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)           43.9 (111.0)
   BLOWER REVOLUTIONS                           61313.
   TOT FLOW STD. CU. METRES(SCF)              117.6 ( 4153.)
   HC   SAMPLE METER/RANGE/PPM                36.0/ 2/  36.
   HC   BCKGRD METER/RANGE/PPM                 9.2/ 2/   9.
   CO   SAMPLE METER/RANGE/PPM                49.9/13/  47.
   CO   BCKGRD METER/RANGE/PPM                 2.1/13/   2.
   CO2  SAMPLE METER/RANGE/PCT                45.0/ 2/ 1.97
   CO2  BCKGRD METER/RANGE/PCT                 1.7/ 2/  .06
   NOX  SAMPLE METER/RANGE/PPM                46.1/ 3/ 138.
   NOX  BCKGRD METER/RANGE/PPM                  .2/ 3/   1.
   DILUTION FACTOR                                 6.77
   HC   CONCENTRATION PPM                          28.
   CO   CONCENTRATION PPM                          44.
   CO2  CONCENTRATION PCT                          1.92
   NOX  CONCENTRATION PPM                        137.8
   HC   MASS GRAMS                                 1.71
   CO   MASS GRAMS                                 5.96
   CO2  MASS GRAMS                              4134.7
   NOX  MASS GRAMS                                23.77
   RUN TIME                 SECONDS              765.
         DFC, WET (DRY)                         .852 ( .850)
         SCF, WET (DRY)                        1.000 ( .979)
         VOL (SCM)                                117.6
         SAM BLR (SCM)                              0.00
         KM  (MEASURED)                            16.39

   TEST NUMBER,                                  036FET
   BAROMETER,               MM HG                761.0
   HUMIDITY,                G/KG                   1.5
   TEMPERATURE,             DEG C                 22.2
    CARBON DIOXIDE,          G/KM                252.3
   FUEL CONSUMPTION,        L/100KM               10.81

   HYDROCARBONS,            G/KM                    .12
   CARBON MONOXIDE,         G/KM                    .36
   OXIDES OF NITROGEN,      G/KM                   1.45
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TABLE D-8. TEST NO. 037 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5030-007

TEST NO.   037FTP   RUN   1                 VEHICLE NO.03                  TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS         DATE     2/12/81               ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                  BAG CART NO.  1                GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                ODOMETER 78662. KM(48878. MILES)
                                            CVS NO.   2

BAROMETER 756.67 MM HG(29.79 IN HG)         DRY BULB TEMP. 21.1 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  16. PCT                  ABS. HUMIDITY  2.5 GM/KG       NOX HUMIDITY CORRECTION FACTOR   .79
BAG RESULTS
  BAG NUMBER                                      1                 2                  3                 4
  DESCRIPTION                               COLD TRANSIENT      STABILIZED        HOT TRANSIENT      STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             779.8 (30.7)       787.4 (31.0)       787.4 (31.0)      787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)           769.6 (30.3)       772.2 (30.4)       777.2 (30.6)      774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          41.1 (106.0)       41.1 (106.0)       40.6 (105.0)      40.6 (105.0)
  BLOWER REVOLUTIONS                           40500.             67534.             40513.            69512.
  TOT FLOW STD. CU. METRES(SCF)              78.0 ( 2754.)     133.6 ( 4716.)      77.9 ( 2749.)    133.6 ( 4718.)
  HC   SAMPLE METER/RANGE/PPM               11.3/ 3/ 113.      32.5/ 2/  33.      62.2/ 2/  62.     28.1/ 2/  28.
  HC   BCKGRD METER/RANGE/PPM                1.1/ 3/  11.      12.1/ 2/  12.      11.6/ 2/  12.     10.5/ 2/  11.
  CO   SAMPLE METER/RANGE/PPM               94.8/11/ 435.      69.8/13/  68.      69.5/12/ 153.     58.7/12/ 128.
  CO   BCKGRD METER/RANGE/PPM                2.1/11/   6.       6.6/13/   6.       2.2/12/   4.      2.2/12/   4.
  CO2 SAMPLE METER/RANGE/PCT                87.8/ 3/ 1.63      60.2/ 3/ 1.07      80.0/ 3/ 1.47     61.3/ 3/ 1.09
  CO2 BCKGRD METER/RANGE/PCT                 3.8/ 3/  .06       3.9/ 3/  .06       4.1/ 3/  .06      4.3/ 3/  .07
  NOX SAMPLE METER/RANGE/PPM                89.4/ 2/  89.      25.1/ 2/  25.      53.7/ 2/  54.     25.3/ 2/  25.
  NOX BCKGRD METER/RANGE/PPM                  .7/ 2/   1.        .9/ 2/   1.        .8/ 2/   1.       .9/ 2/   1.
  DILUTION FACTOR                                7.93              12.44               8.99             12.14
  HC   CONCENTRATION PPM                         103.               21.                52.               18.
  CO   CONCENTRATION PPM                         462.               61.               149.              121.
  CO2 CONCENTRATION PCT                          1.58               1.01               1.41              1.03
  NOX CONCENTRATION PPM                          88.8               24.3               53.2              24.5
  HC   MASS GRAMS                                4.65               1.65               2.33              1.42
  CO   MASS GRAMS                               41.92               9.44              13.50             18.82
  CO2 MASS GRAMS                               2257.8             2474.3             2015.5            2515.2
  NOX MASS GRAMS                                10.42               4.88               6.23              4.92

  HC   GRAMS/KM                                   .80                .26                .40               .23
  CO   GRAMS/KM                                  7.21               1.52               2.33              3.01
  CO2 GRAMS/KM                                  388.4              397.1              347.6             402.8
  NOX GRAMS/KM                                   1.79                .78               1.07               .79
  FUEL CONSUMPTION BY CB L/100KM                17.17              17.09              15.05             17.43

  RUN TIME              SECONDS                  505.               867.               503.              868.
  MEASURED DISTANCE     KM                       5.81               6.23               5.80              6.24
       DFC, WET (DRY)                                    .903 ( .898)                        .907 ( .902)
       SCF, WET (DRY)                                   1.000 ( .983)                       1.000 ( .983)
       VOL (SCM)                                               211.5                               211.5
       SAM BLR (SCM)                                            0.00                                0.00
       KM  (MEASURED)                                          12.04                               12.04
       FUEL CONSUMPTION L/100KM                                17.13                               16.28

COMPOSITE RESULTS
  TEST NUMBER            037FTP                                                       3-BAG        (4-BAG)
  BAROMETER     MM HG    756.7                CARBON DIOXIDE         G/KM            301.7       ( 383.4)
  HUMIDITY      G/KG       2.5                FUEL CONSUMPTION       L/100KM         16.54       ( 16.64)
  TEMPERATURE   DEG C     21.1                HYDROCARBONS (THC)     G/KM              .41       (   .40)
                                              CARBON MONOXIDE        G/KM             2.92       (  3.35)
                                              OXIDES OF NITROGEN     G/KM             1.07       (  1.07)
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                                  HFET   VEHICLE EMISSIONS RESULTS
                                          PROJECT 11-5830-007

TEST NO.   037FET   RUN   1                 VEHICLE NO.03                  TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    79 MERCURY MARQUIS         DATE     2/12/81               ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(351. CID) V-8                  BAG CART NO.  1                GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                ODOMETER 78686. KM(48893. MILES)
                                            CVS NO.   2

BAROMETER 755.90 MM HG(29.76 IN HG)         DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  13. PCT                  ABS. HUMIDITY  2.4 GM/KG       NOX HUMIDITY CORRECTION FACTOR   .78
0 BAG RESULTS
   TEST CYCLE                                   HFET

  BLOWER DIF P MM. H2O(IN. H2O)             787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)           774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          41.1 (106.0)
  BLOWER REVOLUTIONS                           61322.
  TOT FLOW STD. CU. METRES(SCF)             117.6 ( 4153.)
  HC   SAMPLE METER/RANGE/PPM               34.2/ 2/  34.
  HC   BCKGRD METER/RANGE/PPM               11.0/ 2/  11.
  CO   SAMPLE METER/RANGE/PPM               59.9/13/  57.
  CO   BCKGRD METER/RANGE/PPM                3.0/13/   3.
  CO2 SAMPLE METER/RANGE/PCT                44.4/ 2/ 1.94
  CO2 BCKGRD METER/RANGE/PCT                 2.1/ 2/  .07
  NOX SAMPLE METER/RANGE/PPM                44.0/ 3/ 132.
  NOX BCKGRD METER/RANGE/PPM                  .2/ 3/   1.
  DILUTION FACTOR                                6.88
  HC   CONCENTRATION PPM                          25.
  CO   CONCENTRATION PPM                          53.
  CO2 CONCENTRATION PCT                          1.88
  NOX CONCENTRATION PPM                         131.5
  HC   MASS GRAMS                                1.68
  CO   MASS GRAMS                                7.21
  CO2 MASS GRAMS                               4040.6
  NOX MASS GRAMS                                23.20
  RUN TIME                 SECONDS               766.
       DFC, WET (DRY)                        .855 ( .851)
       SCF, WET (DRY)                       1.000 ( .978)
       VOL (SCM)                                117.6
       SAM BLR (SCM)                             0.00
       KM  (MEASURED)                           16.42

  TEST NUMBER,                                 037FET
  BAROMETER,               MM HG                755.9
  HUMIDITY,                G/KG                   2.4
  TEMPERATURE,             DEG C                 23.9
   CARBON DIOXIDE,          G/KM                246.1
  FUEL CONSUMPTION,        L/100KM              10.55

  HYDROCARBONS,            G/KM                   .10
  CARBON MONOXIDE,         G/KM                   .44
  OXIDES OF NITROGEN,      G/KM                  1.41
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TABLE D-9. TEST NO. 041 EMISSIONS RESULTS

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                                        FTP    VEHICLE EMISSIONS RESULTS
                                                PROJECT 11-5830-007

TEST NO.   041FTP   RUN   1                   VEHICLE NO.04                        TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   78 FORD GRANADA               DATE    2/24/81                      ACTUAL ROAD LOAD   9.8 KW( 13.2 HP)
ENGINE 4.9 L(302. CID) V-8                    BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470-F
TRANSMISSION A3                               DYNO NO.      3                      ODOMETER 91705. KM(56983. MILES)

BAROMETER 743.46 MM HG(29.27 IN HG)           DRY BULB TEMP. 27.8 DEG C(82.0 DEG F)
RELATIVE HUMIDITY  31. PCT                    ABS. HUMIDITY  7.4 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .90
BAG RESULTS
  BAG NUMBER                                       1                   2                   3                   4
  DESCRIPTION                               COLD TRANSIENT         STABILIZED       HOT TRANSIENT          STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)        774.7 (30.5)        762.0 (30.0)        774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)           762.0 (30.0)        774.7 (30.5)        762.0 (30.0)        774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)        42.8 (109.0)        43.1 (109.5)        42.8 (109.0)
  BLOWER REVOLUTIONS                           40594.              69526.              40490.              69531.
  TOT FLOW STD. CU. METRES(SCF)              76.4 ( 2698.)      130.6 ( 4611.)       76.2 ( 2689.)      130.6 ( 4612.)
  HC   SAMPLE METER/RANGE/PPM               20.9/ 3/ 209.       67.6/ 2/  68.       21.2/ 3/ 212.       64.4/ 2/  64.
  HC   BCKGRD METER/RANGE/PPM                1.2/ 3/  12.       12.1/ 2/  12.        1.1/ 3/  11.       11.3/ 2/  11.
  CO   SAMPLE METER/RANGE/PPM               43.6/ 3/1049.       70.7/12/ 161.       95.2/11/ 488.       62.0/12/ 137.
  CO   BCKGRD METER/RANGE/PPM                 .1/ 3/   2.         .6/12/   1.         .2/11/   1.         .3/12/   1.
  CO2  SAMPLE METER/RANGE/PCT               96.1/ 3/ 1.81       68.8/ 3/ 1.24       86.3/ 3/ 1.60       67.4/ 3/ 1.21
  CO2  BCKGRD METER/RANGE/PCT                2.8/ 3/  .04        2.4/ 3/  .04        3.3/ 3/  .05        3.1/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM               39.6/ 2/  40.       11.4/ 2/  11.       37.2/ 2/  37.       10.7/ 2/  11.
  NOX  BCKGRD METER/RANGE/PPM                 .6/ 2/   1.         .9/ 2/   1.         .3/ 2/   0.         .4/ 2/   0.
  DILUTION FACTOR                                6.95               10.62                8.03               10.88
  HC   CONCENTRATION PPM                        199.                 57.                202.                 54.
  CO   CONCENTRATION PPM                       1000.                155.                468.                132.
  CO2  CONCENTRATION PCT                        1.77                1.21                1.56                1.17
  NOX  CONCENTRATION PPM                        39.1                10.6                36.9                10.5
  HC   MASS GRAMS                               8.75                4.27                8.89                4.08
  CO   MASS GRAMS                              88.96               23.53               41.50               20.05
  CO2  MASS GRAMS                             2475.3              2885.0              2170.4              2793.6
  NOX  MASS GRAMS                               5.15                2.38                4.85                2.37

  HC   GRAMS/KM                                 1.50                 .68                1.52                 .64
  CO   GRAMS/KM                                15.25                3.74                7.10                3.14
  CO2  GRAMS/KM                                424.4               458.0               371.3               437.3
  NOX  GRAMS/KM                                  .88                 .38                 .83                 .37
  FUEL CONSUMPTION BY CB L/100KM               19.34               19.89               16.53               18.96

  RUN TIME             SECONDS                  505.                867.                505.                868.
  MEASURED DISTANCE    KM                       5.83                6.30                5.84                6.39
  DFC, DRY                                      .973                .979                .975                .979
       DFC, WET (DRY)                                 .887 ( .879)                              .896 ( .887)
       SCF, WET (DRY)                                1.000 ( .977)                             1.000 ( .977)
       VOL (SCM)                                            207.0                                     206.8
       SAM BLR (SCM)                                         0.00                                      0.00
       KM  (MEASURED)                                       12.13                                     12.23
       FUEL CONSUMPTION L/100KM                             19.62                                     17.80

COMPOSITE RESULTS                                                                                   3-BAG        (4-BAG)
  TEST NUMBER          041FTP                                     CARBON DIOXIDE       G/KM         427.3       ( 421.3)
  BAROMETER     MM HG  743.5                                      FUEL CONSUMPTION     L/100KM      18.05       ( 18.30)
  HUMIDITY      G/KG     7.4                                      HYDROCARBONS (THC)   G/KM          1.08       (  1.07)
  TEMPERATURE   DEG C   27.8                                      CARBON MONOXIDE      G/KM          7.04       (  6.85)
                                                                  OXIDES OF NITROGEN   G/KM           .61       (   .60)


                                        HFET   VEHICLE EMISSIONS RESULTS
                                                PROJECT 11-5830-007

TEST NO.   041FTP   RUN   1                   VEHICLE NO.04                        TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   78 FORD GRANADA               DATE    2/24/81                      ACTUAL ROAD LOAD   9.8 KW( 13.2 HP)
ENGINE 4.9 L(302. CID) V-8                    BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                               DYNO NO.      3                      ODOMETER 91728. KM(56997. MILES)
                                              CVS NO.   2

BAROMETER 743.46 MM HG(29.27 IN HG)           DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  42. PCT                    ABS. HUMIDITY  8.2 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .92
0 BAG RESULTS
  TEST CYCLE                                      HFET

  BLOWER DIF P MM. H2O(IN. H2O)             774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)           774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)
  BLOWER REVOLUTIONS                           61352.
  TOT FLOW STD. CU. METRES(SCF)             115.2 ( 4069.)
  HC   SAMPLE METER/RANGE/PPM               13.2/ 3/ 132.
  HC   BCKGRD METER/RANGE/PPM                1.1/ 3/  11.
  CO   SAMPLE METER/RANGE/PPM               64.3/11/ 260.
  CO   BCKGRD METER/RANGE/PPM                 .1/11/   0.
  CO2  SAMPLE METER/RANGE/PCT               50.4/ 2/ 2.26
  CO2  BCKGRD METER/RANGE/PCT                1.1/ 2/  .04
  NOX  SAMPLE METER/RANGE/PPM               55.0/ 2/  55.
  NOX  BCKGRD METER/RANGE/PPM                1.1/ 2/   1.
  DILUTION FACTOR                                5.83
  HC   CONCENTRATION PPM                        123.
  CO   CONCENTRATION PPM                        245.
  CO2  CONCENTRATION PCT                        2.23
  NOX  CONCENTRATION PPM                        54.1
  HC   MASS GRAMS                               8.17
  CO   MASS GRAMS                              32.92
  CO2  MASS GRAMS                             4702.4
  NOX  MASS GRAMS                              10.99
  RUN TIME             SECONDS                  766.
       DFC, WET (DRY)                        .828 ( .817)
       SCF, WET (DRY)                       1.000 ( .966)
       VOL (SCM)                               115.2
       SAM BLR (SCM)                            0.00
       KM  (MEASURED)                          16.53

  TEST NUMBER,                                 041FTP
  BAROMETER,           MM HG                    743.5
  HUMIDITY,            G/KG                       8.2
  TEMPERATURE,         DEG C                     24.4
   CARBON DIOXIDE,      G/KM                    284.5
  FUEL CONSUMPTION,    L/100KM                  12.34

  HYDROCARBONS,        G/KM                       .49
  CARBON MONOXIDE,     G/KM                      1.99
  OXIDES OF NITROGEN,  G/KM                       .66
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TABLE D-10. TEST NC. 042 EMISSIONS RESULTS

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                                         FTP    VEHICLE EMISSIONS RESULTS
                                                  PROJECT 11-5030-007

TEST NO.   042FTP   RUN   2                  VEHICLE NO.04                              TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FORD GRANADA              DATE    2/25/01                            ACTUAL ROAD LOAD   9.0 KW( 13.2 HP)
ENGINE 4.9 L(302. CID) V-8                   BAG CART NO. 1 / CVS NO.  2                GASOLINE  EM-470-F
TRANSMISSION A3                              DYNO NO.      3                            ODOMETER 91750. KM(57016. MILES)

BAROMETER 741.43 MM HG(29.19 IN HG)          DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
RELATIVE HUMIDITY  58. PCT                   ABS. HUMIDITY 10.7 GM/KG                   NOX HUMIDITY CORRECTION FACTOR  1.00
BAG RESULTS
   BAG NUMBER                                      1                    2                      3                     4
   DESCRIPTION                              COLD TRANSIENT         STABILIZED           HOT TRANSIENT           STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)             774.7 (30.5)         774.7 (30.5)          762.0 (30.0)          774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)           774.7 (30.5)         774.7 (30.5)          762.0 (30.0)          774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)         42.8 (109.0)          43.3 (110.0)          42.8 (109.0)
   BLOWER REVOLUTIONS                           40597.               69600.                40537.                69536.
   TOT FLOW STD. CU. METRES(SCF)              76.0 ( 2682.)       130.3 ( 4603.)         76.0 ( 2683.)        130.2 ( 4598.)
   HC  SAMPLE METER/RANGE/PPM                22.0/ 3/ 220.        74.0/ 2/  75.         19.5/ 3/ 195.         67.1/ 2/  69.
   HC  BCKGRD METER/RANGE/PPM                 1.2/ 3/  12.        12.8/ 2/  13.          1.4/ 3/  14.         14.6/ 2/  15.
   CO  SAMPLE METER/RANGE/PPM                43.5/ 3/1047.        79.9/12/ 107.         90.5/11/ 446.         51.4/12/ 109.
   CO  BCKGRD METER/RANGE/PPM                  .1/ 3/   2.          .6/12/   1.           .7/11/   2.          1.0/12/   2.
   CO2 SAMPLE METER/RANGE/PCT                95.0/ 3/ 1.80        68.8/ 3/ 1.24         86.9/ 3/ 1.61         68.0/ 3/ 1.22
   CO2 BCKGRD METER/RANGE/PCT                 3.2/ 3/  .05         2.8/ 3/  .04          3.0/ 3/  .05          3.0/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM                36.8/ 2/  37.         9.9/ 2/  10.         37.5/ 2/  38.         12.7/ 2/  13.
   NOX BCKGRD METER/RANGE/PPM                  .6/ 2/   1.          .5/ 2/   1.           .8/ 2/   1.           .0/ 2/   1.
   DILUTION FACTOR                               6.98                10.59                  8.00                 10.30
   HC  CONCENTRATION PPM                        210.                  63.                  183.                   56.
   CO  CONCENTRATION PPM                        907.                 100.                  422.                  103.
   CO2 CONCENTRATION PCT                        1.76                 1.20                  1.57                  1.18
   NOX CONCENTRATION PPM                        36.3                  9.4                  36.8                  12.0
   HC  MASS GRAMS                               9.19                 4.75                  8.01                  4.19
   CO  MASS GRAMS                              87.43                27.27                 37.32                 15.63
   CO2 MASS GRAMS                             2444.9               2866.1                2188.4                2817.0
   NOX MASS GRAMS                               5.27                 2.35                  5.35                  2.98

   HC  GRAMS/KM                                 1.56                  .74                  1.37                   .66
   CO  GRAMS/KM                                14.81                 4.23                  6.40                  2.47
   CO2 GRAMS/KM                                414.2                444.1                 375.0                 444.6
   NOX GRAMS/KM                                  .89                  .36                   .92                   .47
   FUEL CONSUMPTION BY CB L/100KM              18.88                19.34                 16.62                 19.23

   RUN TIME              SECONDS                505.                 867.                  505.                  867.
   MEASURED DISTANCE     KM                     5.90                 6.45                  5.84                  6.34
   DFC, DRY                                     .965                 .970                  .966                  .970
        DFC, WET (DRY)                                  .888 ( .871)                                .895 ( .879)
        SCF, WET (DRY)                                 1.000 ( .968)                               1.000 ( .967)
        VOL (SCM)                                             206.3                                       206.2
        SAM BLR (SCM)                                          0.00                                        0.00
        KM  (MEASURED)                                        12.36                                       12.17
        FUEL CONSUMPTION L/100KM                              19.12                                       17.98

COMPOSITE RESULTS                                                                                   3-BAG       (4-BAG)
    TEST NUMBER             042FTP                                 CARBON DIOXIDE       G/KM        417.2       ( 419.2)
    BAROMETER      MM HG   741.4                                   FUEL CONSUMPTION     L/100KM     18.51       ( 18.47)
    HUMIDITY       G/KG     10.7                                   HYDROCARBONS (THC)   G/KM         1.08       (  1.06)
    TEMPERATURE    DEG C    23.3                                   CARBON MONOXIDE      G/KM         6.99       (  6.47)
                                                                   OXIDES OF NITROGEN   G/KM          .62       (   .66)
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                                         HFET   VEHICLE EMISSIONS RESULTS
                                                  PROJECT 11-5030-007

TEST NO.   042FET   RUN   2                  VEHICLE NO.04                              TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FORD GRANADA              DATE    2/25/01                            ACTUAL ROAD LOAD   9.8 KW( 13.2 HP)
ENGINE 4.9 L(302. CID) V-8                   BAG CART NO.  1                            GASOLINE  EM-470-F
TRANSMISSION A3                              DYNO NO.      3                            ODOMETER 91781. KM(57030. MILES)
                                             CVS NO.   2

BAROMETER 741.68 MM HG(29.20 IN HG)          DRY BULB TEMP. 28.9 DEG C(84.0 DEG F)
RELATIVE HUMIDITY  44. PCT                   ABS. HUMIDITY 11.2 GM/KG                   NOX HUMIDITY CORRECTION FACTOR  1.02
0 BAG RESULTS
    TEST CYCLE                                     HFET

    BLOWER DIF P MM. H2O(IN. H2O)             787.4 (31.0)
    BLOWER INLET P MM. H2O(IN. H2O)           787.4 (31.0)
    BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)
    BLOWER REVOLUTIONS                           61297.
    TOT FLOW STD. CU. METRES(SCF)             114.5 ( 4043.)
    HC  SAMPLE METER/RANGE/PPM                16.0/ 3/ 160.
    HC  BCKGRD METER/RANGE/PPM                 1.5/ 3/  15.
    CO  SAMPLE METER/RANGE/PPM                83.7/11/ 390.
    CO  BCKGRD METER/RANGE/PPM                  .8/11/   2.
    CO2 SAMPLE METER/RANGE/PCT                50.6/ 2/ 2.27
    CO2 BCKGRD METER/RANGE/PCT                 1.4/ 2/  .05
    NOX SAMPLE METER/RANGE/PPM                52.4/ 2/  52.
    NOX BCKGRD METER/RANGE/PPM                  .3/ 2/   0.
    DILUTION FACTOR                               5.76
    HC  CONCENTRATION PPM                        148.
    CO  CONCENTRATION PPM                        366.
    CO2 CONCENTRATION PCT                        2.23
    NOX CONCENTRATION PPM                        52.2
    HC  MASS GRAMS                               9.75
    CO  MASS GRAMS                              48.75
    CO2 MASS GRAMS                             4677.2
    NOX MASS GRAMS                              11.62
    RUN TIME                 SECONDS             765.
         DFC, WET (DRY)                       .827 ( .815)
         SCF, WET (DRY)                      1.000 ( .765)
         VOL (SCM)                               114.5
         SAM BLR (SCM)                            0.00
         KM  (MEASURED)                          16.54

    TEST NUMBER,                                042FET
    BAROMETER,              MM HG                741.7
    HUMIDITY,               G/KG                  11.2
    TEMPERATURE,            DEG C                 28.9
     CARBON DIOXIDE,         G/KM                282.8
    FUEL CONSUMPTION,       L/100KM              12.35

    HYDROCARBONS,           G/KM                   .59
    CARBON MONOXIDE,        G/KM                 -2.95
    OXIDES OF NITROGEN,     G/KM                   .70
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TABLE D-11. TEST NO. 046 EMISSIONS RESULTS

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                                     FTP    VEHICLE EMISSIONS RESULTS
                                             PROJECT 11-5030-007

TEST NO.   046FTP   RUN   1                   VEHICLE NO.04                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   78 FORD GRANADA               DATE    2/26/81                    ACTUAL ROAD LOAD   9.8 KW( 13.2 HP)
ENGINE 4.9 L(302. CID) V-8                    BAG CART NO. 1 / CVS NO.  2        GASOLINE  EM-470-F
TRANSMISSION A3                               DYNO NO.      3                    ODOMETER 91807. KM(57046. MILES)

BAROMETER 742.19 MM HG(29.22 IN HG)           DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  56. PCT                    ABS. HUMIDITY 11.4 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.02
BAG RESULTS
  BAG NUMBER                                       1               2                 3                4
  DESCRIPTION                               COLD TRANSIENT     STABILIZED      HOT TRANSIENT      STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)      774.7 (30.5)     774.7 (30.5)      774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)           762.0 (30.0)      774.7 (30.5)     774.7 (30.5)      774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          41.1 (106.0)      42.2 (108.0)     43.3 (110.0)      43.3 (110.0)
  BLOWER REVOLUTIONS                           40534.            69634.           40554.            69528.
  TOT FLOW STD. CU. METRES(SCF)              76.4 ( 2697.)    130.7 ( 4615.)    76.0 ( 2682.)    130.2 ( 4598.)
  HC   SAMPLE METER/RANGE/PPM               29.8/ 3/ 298.     30.0/ 2/  80.    13.4/ 3/ 134.     71.3/ 2/  71.
  HC   BCKGRD METER/RANGE/PPM                1.5/ 3/  15.     14.5/ 2/  15.     1.4/ 3/  14.     14.4/ 2/  14.
  CO   SAMPLE METER/RANGE/PPM               54.9/ 3/1361.     67.0/13/  65.    84.3/12/ 203.     30.2/13/  56.
  CO   BCKGRD METER/RANGE/PPM                 .2/ 3/   5.      6.6/13/   6.     2.7/12/   5.      4.8/13/   4.
  CO2  SAMPLE METER/RANGE/PCT               95.5/ 3/ 1.79     66.6/ 3/ 1.20    85.1/ 3/ 1.58     64.8/ 3/ 1.16
  CO2  BCKGRD METER/RANGE/PCT                3.4/ 3/  .05      3.8/ 3/  .06     3.6/ 3/  .06      3.7/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM               36.1/ 2/  36.     10.6/ 2/  11.    39.4/ 2/  39.     12.8/ 2/  13.
  NOX  BCKGRD METER/RANGE/PPM                1.0/ 2/   1.       .9/ 2/   1.      .9/ 2/   1.       .7/ 2/   1.
  DILUTION FACTOR                                6.36             11.08             8.33             11.44
  HC   CONCENTRATION PPM                        285.               67.             122.               58.
  CO   CONCENTRATION PPM                       1206.               57.             108.               49.
  CO2  CONCENTRATION PCT                        1.75              1.14             1.53              1.11
  NOX  CONCENTRATION PPM                        35.2               9.8             38.6              12.2
  HC   MASS GRAMS                              12.56              5.03             5.33              4.37
  CO   MASS GRAMS                             114.33              8.66            16.67              7.50
  CO2  MASS GRAMS                             2445.9            2733.0            2123.9            2639.7
  NOX  MASS GRAMS                               5.27              2.50             5.74              3.10

  HC   GRAMS/KM                                 2.16               .81              .92               .70
  CO   GRAMS/KM                                19.70              1.40             2.88              1.20
  CO2  GRAMS/KM                                421.4             441.1            367.7             422.9
  NOX  GRAMS/KM                                  .91               .40              .99               .50
  FUEL CONSUMPTION BY CB L/100KM               19.60             19.03            16.01             18.22

  RUN TIME              SECONDS                 505.              867.             505.              867.
  MEASURED DISTANCE     KM                      5.80              6.20             5.78              6.24
  DFC, DRY                                      .965              .971             .967              .971
       DFC, WET (DRY)                                 .889 ( .873)                        .901 ( .884)
       SCF, WET (DRY)                                1.000 ( .767)                       1.000 ( .970)
       VOL (SCM)                                            207.1                               206.2
       SAM BLR (SCM)                                         0.00                                0.00
       KM  (MEASURED)                                       12.00                               12.02
       FUEL CONSUMPTION L/100KM                             17.31                               17.16
COMPOSITE RESULTS                                                                            3-BAG       (4-BAG)
  TEST NUMBER           046FTP                                   CARBON DIOXIDE       G/KM     416.8      ( 411.5)
  BAROMETER     MM HG   742.2                                    FUEL CONSUMPTION     L/100KM  18.32      ( 18.08)
  HUMIDITY      G/KG     11.4                                    HYDROCARBONS (THC)   G/KM      1.12      (  1.07)
  TEMPERATURE   DEG C    25.0                                    CARBON MONOXIDE      G/KM      5.61      (  5.55)
                                                                 OXIDES OF NITROGEN   G/KM       .67      (   .70)
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                                     FET    VEHICLE EMISSIONS RESULTS
                                             PROJECT 11-5030-007

TEST NO.   046FET   RUN   1                   VEHICLE NO.04                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   78 FORD GRANADA               DATE    2/26/81                    ACTUAL ROAD LOAD   9.8 KW( 13.2 HP)
ENGINE 4.9 L(302. CID) V-8                    BAG CART NO.  1                    GASOLINE  EM-470-F
TRANSMISSION A3                               DYNO NO.      3                    ODOMETER 91829. KM(57060. MILES)
                                              CVS NO.   2

BAROMETER 742.19 MM HG(29.22 IN HG)           DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  54. PCT                    ABS. HUMIDITY 12.2 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.05
0 BAG RESULTS
   TEST CYCLE                                    FET

   BLOWER DIF P MM. H2O(IN. H2O)              787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)            787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)           43.6 (110.5)
   BLOWER REVOLUTIONS                            61315.
   TOT FLOW STD. CU. METRES(SCF)              114.6 ( 4046.)
   HC   SAMPLE METER/RANGE/PPM                17.3/ 3/ 173.
   HC   BCKGRD METER/RANGE/PPM                 1.6/ 3/  16.
   CO   SAMPLE METER/RANGE/PPM                94.1/12/ 235.
   CO   BCKGRD METER/RANGE/PPM                 1.7/12/   3.
   CO2  SAMPLE METER/RANGE/PCT                50.5/ 2/ 2.27
   CO2  BCKGRD METER/RANGE/PCT                 1.8/ 2/  .06
   NOX  SAMPLE METER/RANGE/PPM                54.9/ 2/  55.
   NOX  BCKGRD METER/RANGE/PPM                  .7/ 2/   1.
   DILUTION FACTOR                                 5.81
   HC   CONCENTRATION PPM                         150.
   CO   CONCENTRATION PPM                         210.
   CO2  CONCENTRATION PCT                          2.21
   NOX  CONCENTRATION PPM                          54.3
   HC   MASS GRAMS                                10.55
   CO   MASS GRAMS                                29.11
   CO2  MASS GRAMS                               4643.5
   NOX  MASS GRAMS                                12.51
   RUN TIME                    SECONDS            765.
        DFC, WET (DRY)                        .828 ( .813)
        SCF, WET (DRY)                       1.000 ( .962)
        VOL (SCM)                                 114.6
        SAM BLR (SCM)                              0.00
        KM  (MEASURED)                            16.31

   TEST NUMBER,                                  046FET
   BAROMETER,                  MM HG              742.2
   HUMIDITY,                   G/KG                12.2
   TEMPERATURE,                DEG C               26.7
    CARBON DIOXIDE,             G/KM              284.0
   FUEL CONSUMPTION,           L/100KM            12.36

   HYDROCARBONS,               G/KM                 .65
   CARBON MONOXIDE,            G/KM                1.79
   OXIDES OF NITROGEN,         G/KM                 .77
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TABLE D-12. TEST NO. 051 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5330-007

TEST NO.   051FTP   RUN   1                VEHICLE NO.05                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL         DATE    3/ 2/81                  ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                 BAG CART NO. 1 / CVS NO.  2      GASOLINE  EM-470-F
TRANSMISSION M4                            DYNO NO.      3                  ODOMETER  9494. KM( 5899. MILES)

BAROMETER 741.68 MM HG(29.20 IN HG)        DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  48. PCT                 ABS. HUMIDITY  9.1 GM/KG         NOX HUMIDITY CORRECTION FACTOR   .95
BAG RESULTS
   BAG NUMBER                                      1                 2                  3                  4
   DESCRIPTION                              COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)            749.3 (29.5)      762.0 (30.0)      749.3 (29.5)      762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)          749.3 (29.5)      762.0 (30.0)      749.3 (29.5)      762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)         42.8 (109.0)      42.2 (108.0)      43.3 (110.0)      42.8 (109.0)
   BLOWER REVOLUTIONS                          40408.            67757.            40481.            69586.
   TOT FLOW STD. CU. METRES(SCF)             76.0 ( 2683.)    131.1 ( 4628.)     76.0 ( 2685.)    130.6 ( 4612.)
   HC  SAMPLE METER/RANGE/PPM                9.6/ 3/  96.      39.1/ 2/  39.     49.0/ 2/  49.     42.6/ 2/  43.
   HC  BCKGRD METER/RANGE/PPM                1.4/ 3/  14.      13.0/ 2/  13.     11.6/ 2/  12.     11.5/ 2/  12.
   CO  SAMPLE METER/RANGE/PPM               90.4/11/ 445.      65.2/12/ 146.     74.7/12/ 173.     76.3/12/ 170.
   CO  BCKGRD METER/RANGE/PPM                1.5/11/   4.       1.1/12/   2.       .6/12/   1.       .4/12/   1.
   CO2 SAMPLE METER/RANGE/PCT               70.7/ 3/ 1.28      51.9/ 3/  .90     66.0/ 3/ 1.18     50.0/ 3/  .87
   CO2 BCKGRD METER/RANGE/PCT                4.1/ 3/  .06       4.2/ 3/  .06      3.3/ 3/  .05      3.1/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM               35.4/ 2/  35.       6.5/ 2/   7.     30.6/ 2/  31.      8.2/ 2/   8.
   NOX BCKGRD METER/RANGE/PPM                 .4/ 2/   0.        .3/ 2/   0.       .9/ 2/   1.       .9/ 2/   1.
   DILUTION FACTOR                              10.07             14.54             11.12             15.08
   HC  CONCENTRATION PPM                        83.               27.               38.               32.
   CO  CONCENTRATION PPM                       423.              139.              165.              171.
   CO2 CONCENTRATION PCT                        1.22              .84              1.14               .82
   NOX CONCENTRATION PPM                        35.0              6.2              29.8               7.4
   HC  MASS GRAMS                               3.65              2.04              1.69              2.40
   CO  MASS GRAMS                              37.45             21.21             14.64             26.05
   CO2 MASS GRAMS                             1699.7            2024.7            1583.2            1967.5
   NOX MASS GRAMS                               4.83              1.48              4.11              1.74

   HC  GRAMS/KM                                  .63               .32               .29               .39
   CO  GRAMS/KM                                 6.44              3.37              2.50              4.19
   CO2 GRAMS/KM                                292.5             321.6             270.7             316.1
   NOX GRAMS/KM                                  .83               .24               .70               .28
   FUEL CONSUMPTION BY CB L/100KM              13.00             14.00             11.76             13.82

   RUN TIME                 SECONDS             503.              869.              504.              868.
   MEASURED DISTANCE        KM                  5.81              6.30              5.85              6.23
   SCF, DRY                                     .973              .976              .974              .977
        DFC, WET (DRY)                                  .920 ( .906)                         .925 ( .911)
        SCF, WET (DRY)                                 1.000 ( .975)                        1.000 ( .975)
        VOL (SCM)                                             207.1                                206.7
        SAM BLR (SCM)                                          0.00                                 0.00
        KM  (MEASURED)                                        12.11                                12.07
        FUEL CONSUMPTION L/100KM                              13.52                                12.83

COMPOSITE RESULTS
   TEST NUMBER          051FTP
   BAROMETER    MM HG   741.7
   HUMIDITY     G/KG      9.1
   TEMPERATURE  DEG C    23.9
                                                                                      3-BAG       (4-BAG)
                                            CARBON DIOXIDE        G/KM               301.6      ( 299.9)
                                            FUEL CONSUMPTION      L/100KM            13.18      ( 13.12)
                                            HYDROCARBONS (THC)    G/KM                 .38      (   .40)
                                            CARBON MONOXIDE       G/KM                3.77      (  4.00)
                                            OXIDES OF NITROGEN    G/KM                 .49      (   .50)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   051FET   RUN   1                VEHICLE NO.05                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL         DATE    3/ 2/81                  ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                 BAG CART NO.  1                  GASOLINE  EM-470-F
TRANSMISSION M4                            DYNO NO.      3                  ODOMETER 94969. KM(59011. MILES)
                                           CVS NO.   2

BAROMETER 741.93 MM HG(29.21 IN HG)        DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  49. PCT                 ABS. HUMIDITY 10.0 GM/KG         NOX HUMIDITY CORRECTION FACTOR   .98
0 BAG RESULTS
   TEST CYCLE                                   HFET

   BLOWER DIF P MM. H2O(IN. H2O)            756.9 (29.8)
   BLOWER INLET P MM. H2O(IN. H2O)          756.9 (29.8)
   BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)
   BLOWER REVOLUTIONS                          61429.
   TOT FLOW STD. CU. METRES(SCF)            115.3 ( 4072.)
   HC  SAMPLE METER/RANGE/PPM               73.4/ 2/  73.
   HC  BCKGRD METER/RANGE/PPM               12.1/ 2/  12.
   CO  SAMPLE METER/RANGE/PPM               95.8/12/ 241.
   CO  BCKGRD METER/RANGE/PPM                 .4/12/   1.
   CO2 SAMPLE METER/RANGE/PCT               79.1/ 3/ 1.45
   CO2 BCKGRD METER/RANGE/PCT                3.1/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM               27.1/ 2/  27.
   NOX BCKGRD METER/RANGE/PPM                1.2/ 2/   1.
   DILUTION FACTOR                              9.05
   HC  CONCENTRATION PPM                        63.
   CO  CONCENTRATION PPM                       230.
   CO2 CONCENTRATION PCT                        1.41
   NOX CONCENTRATION PPM                        26.0
   HC  MASS GRAMS                               4.16
   CO  MASS GRAMS                              30.86
   CO2 MASS GRAMS                             2974.3
   NOX MASS GRAMS                               5.60
   RUN TIME                 SECONDS             766.
        DFC, WET (DRY)                      .889 ( .875)
        SCF, WET (DRY)                     1.000 ( .971)
        VOL (SCM)                              115.3
        SAM BLR (SCM)                           0.00
        KM  (MEASURED)                         16.39

   TEST NUMBER,                                051FET
   BAROMETER,               MM HG               741.9
   HUMIDITY,                G/KG                 10.0
   TEMPERATURE,             DEG C                25.0
    CARBON DIOXIDE,          G/KM               181.5
   FUEL CONSUMPTION,        L/100KM              7.91

   HYDROCARBONS,            G/KM                  .25
   CARBON MONOXIDE,         G/KM                 1.08
   OXIDES OF NITROGEN,      G/KM                  .34
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TABLE D-13. TEST NO. 052 EMISSIONS RESULTS

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                                 FTP    VEHICLE EMISSIONS RESULTS
                                          PROJECT 11-5830-007

TEST NO.   052FTP   RUN   1                   VEHICLE NO.05                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL            DATE    3/ 3/81                      ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                    BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470-F
TRANSMISSION M4                               DYNO NO.     3                       ODOMETER 95003. KM(59032. MILES)

BAROMETER 735.58 MM HG(28.96 IN HG)           DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
RELATIVE HUMIDITY  62. PCT                    ABS. HUMIDITY 11.5 GM/KG             NOX HUMIDITY CORRECTION FACTOR  1.03
BAG RESULTS
  BAG NUMBER                                        1                 2                  3                 4
  DESCRIPTION                                COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)              754.4 (29.7)      759.5 (29.9)      759.5 (29.9)      754.4 (29.7)
  BLOWER INLET P MM. H2O(IN. H2O)            749.3 (29.5)      746.0 (29.4)      749.3 (29.5)      744.2 (29.3)
  BLOWER INLET TEMP. DEG. C(DEG. F)           42.8 (109.0)      42.8 (109.0)      42.2 (108.0)      42.2 (108.0)
  BLOWER REVOLUTIONS                            40502.            69611.            40500.            69564.
  TOT FLOW STD. CU. METRES(SCF)               75.3 ( 2665.)    129.7 ( 4580.)     75.5 ( 2666.)    129.8 ( 4583.)
  HC  SAMPLE METER/RANGE/PPM                  9.4/ 3/  94.     46.9/ 2/  47.     49.8/ 2/  50.     43.9/ 2/  44.
  HC  BCKGRD METER/RANGE/PPM                  1.7/ 3/  17.     17.4/ 2/  17.     17.2/ 2/  17.     17.5/ 2/  18.
  CO  SAMPLE METER/RANGE/PPM                 87.0/11/ 416.     68.4/12/ 155.     64.6/12/ 144.     61.7/12/ 136.
  CO  BCKGRD METER/RANGE/PPM                  2.5/11/   7.      3.2/12/   6.      2.3/12/   4.      1.7/12/   3.
  CO2 SAMPLE METER/RANGE/PCT                 71.5/ 3/ 1.29     51.6/ 3/  .90     65.4/ 3/ 1.17     49.8/ 3/  .86
  CO2 BCKGRD METER/RANGE/PCT                  3.6/ 3/  .06      3.3/ 3/  .05      3.2/ 3/  .05      3.0/ 3/  .05
  NOX SAMPLE METER/RANGE/PPM                 35.0/ 2/  35.      7.1/ 2/   7.     28.5/ 2/  29.      8.3/ 2/   9.
  NOX BCKGRD METER/RANGE/PPM                   .8/ 2/   1.       .9/ 2/   1.      1.3/ 2/   1.      1.2/ 2/   1.
  DILUTION FACTOR                                9.97             14.60             11.26             15.21
  HC  CONCENTRATION PPM                          79.               31.               34.               28.
  CO  CONCENTRATION PPM                         391.              143.              134.              128.
  CO2 CONCENTRATION PCT                         1.25               .85              1.13               .82
  NOX CONCENTRATION PPM                         34.3               6.3              27.3               7.4
  HC  MASS GRAMS                                3.42              2.30              1.49              2.06
  CO  MASS GRAMS                               34.37             21.64             11.78             19.38
  CO2 MASS GRAMS                              1720.2            2020.8            1557.3            1949.6
  NOX MASS GRAMS                                5.08              1.60              4.05              1.88

  HC  GRAMS/KM                                   .59               .37               .26               .33
  CO  GRAMS/KM                                  5.95              3.46              2.05              3.11
  CO2 GRAMS/KM                                 297.7             322.7             270.2             312.6
  NOX GRAMS/KM                                   .88               .25               .70               .30
  FUEL CONSUMPTION BY CB L/100KM               13.19             14.06             11.71             13.59

  RUN TIME               SECONDS                504.              867.              505.              867.
  MEASURED DISTANCE      KM                     5.78              6.26              5.76              6.24
  SCF, DRY                                      .968              .972              .969              .972
       DFC, WET (DRY)                                  .920 ( .901)                        .926 ( .907)
       SCF, WET (DRY)                                 1.000 ( .970)                       1.000 ( .971)
       VOL (SCM)                                             205.2                               205.3
       SAM BLR (SCM)                                          0.00                                0.00
       KM  (MEASURED)                                        12.04                               12.00
       FUEL CONSUMPTION L/100KM                              13.64                               12.69

COMPOSITE RESULTS                                                                               3-BAG       (4-BAG)
  TEST NUMBER          052FTP                                  CARBON DIOXIDE       G/KM       303.2      ( 300.2)
  BAROMETER     MM HG  735.6                                   FUEL CONSUMPTION     L/100KM     13.23      ( 13.10)
  HUMIDITY      G/KG    11.5                                   HYDROCARBONS (THC)   G/KM         .38      (   .37)
  TEMPERATURE   DEG C   23.3                                   CARBON MONOXIDE      G/KM        3.59      (  3.48)
                                                               OXIDES OF NITROGEN   G/KM         .51      (   .52)
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                                 HFET   VEHICLE EMISSIONS RESULTS
                                          PROJECT 11-5830-007

TEST NO.   052FET   RUN   1                   VEHICLE NO.05                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL            DATE    3/ 3/81                      ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                    BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION M4                               DYNO NO.      3                      ODOMETER 95027. KM(59047. MILES)
                                              CVS NO.   2

BAROMETER 734.57 MM HG(28.92 IN HG)           DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  54. PCT                    ABS. HUMIDITY 11.8 GM/KG             NOX HUMIDITY CORRECTION FACTOR  1.04
0 BAG RESULTS
  TEST CYCLE                                       HFET

  BLOWER DIF P MM. H2O(IN. H2O)              759.5 (29.9)
  BLOWER INLET P MM. H2O(IN. H2O)            749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)           40.0 (104.0)
  BLOWER REVOLUTIONS                            81278.
  TOT FLOW STD. CU. METRES(SCF)              114.5 ( 4045.)
  HC  SAMPLE METER/RANGE/PPM                 69.7/ 2/  70.
  HC  BCKGRD METER/RANGE/PPM                 17.3/ 2/  17.
  CO  SAMPLE METER/RANGE/PPM                 68.5/12/ 155.
  CO  BCKGRD METER/RANGE/PPM                  1.5/12/   3.
  CO2 SAMPLE METER/RANGE/PCT                 78.4/ 3/ 1.44
  CO2 BCKGRD METER/RANGE/PCT                  3.3/ 3/  .05
  NOX SAMPLE METER/RANGE/PPM                 18.4/ 2/  18.
  NOX BCKGRD METER/RANGE/PPM                  1.0/ 2/   1.
  DILUTION FACTOR                                9.19
  HC  CONCENTRATION PPM                          54.
  CO  CONCENTRATION PPM                         146.
  CO2 CONCENTRATION PCT                         1.39
  NOX CONCENTRATION PPM                         17.5
  HC  MASS GRAMS                                3.59
  CO  MASS GRAMS                               19.40
  CO2 MASS GRAMS                              2918.3
  NOX MASS GRAMS                                3.98
  RUN TIME               SECONDS                765.
       DFC, WET (DRY)                        .891 ( .876)
       SCF, WET (DRY)                       1.000 ( .969)
       VOL (SCM)                               114.5
       SAM BLR (SCM)                            0.00
       KM  (MEASURED)                          16.34

  TEST NUMBER,                                052FET
  BAROMETER,             MM HG                 734.6
  HUMIDITY,              G/KG                   11.8
  TEMPERATURE,           DEG C                  26.1
   CARBON DIOXIDE,         G/KM                178.6
  FUEL CONSUMPTION,      L/100KM                7.73

  HYDROCARBONS,          G/KM                    .22
  CARBON MONOXIDE,       G/KM                   1.19
  OXIDES OF NITROGEN,    G/KM                    .24
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TABLE D-14. TEST NO. 056 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   056FTP   RUN   1                  VEHICLE NO.05                     TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL           DATE    3/ 4/81                   ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                   BAG CART NO. 1 / CVS NO.  2       GASOLINE  EM-470-F
TRANSMISSION M4                              DYNO NO.     3                    ODOMETER  9508. KM( 5908. MILES)

BAROMETER 731.77 MM HG(28.81 IN HG)          DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  44. PCT                   ABS. HUMIDITY  9.7 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .97
BAG RESULTS
   BAG NUMBER                                      1                   2                  3                   4
   DESCRIPTION                               COLD TRANSIENT        STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)             749.3 (29.5)         749.3 (29.5)       749.3 (29.5)        749.3 (29.5)
   BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)         749.3 (29.5)       749.3 (29.5)        749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)         41.7 (107.0)       42.8 (109.0)        42.8 (109.0)
   BLOWER REVOLUTIONS                          40442.               69718.             40516.              69607.
   TOT FLOW STD. CU. METRES(SCF)              74.9 ( 2646.)       129.4 ( 4570.)      75.1 ( 2651.)      129.0 ( 4554.)
   HC  SAMPLE METER/RANGE/PPM                97.3/ 2/  97.        47.8/ 2/  48.      53.6/ 2/  54.       43.6/ 2/  44.
   HC  BCKGRD METER/RANGE/PPM                16.7/ 2/  17.        15.0/ 2/  15.      12.9/ 2/  13.       11.7/ 2/  12.
   CO  SAMPLE METER/RANGE/PPM                82.8/11/ 383.        73.2/12/ 169.      59.4/12/ 130.       64.5/12/ 144.
   CO  BCKGRD METER/RANGE/PPM                  .5/11/   1.          .6/12/   1.        .1/12/   0.         .2/12/   0.
   CO2 SAMPLE METER/RANGE/PCT                67.7/ 3/ 1.22        48.6/ 3/  .84      62.9/ 3/ 1.12       47.2/ 3/  .81
   CO2 BCKGRD METER/RANGE/PCT                 3.4/ 3/  .05         3.2/ 3/  .05       3.1/ 3/  .05        3.1/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM                37.6/ 2/  38.         7.7/ 2/   8.      31.2/ 2/  31.        7.4/ 2/   7.
   NOX BCKGRD METER/RANGE/PPM                  .9/ 2/   1.         1.0/ 2/   1.        .9/ 2/   1.         .7/ 2/   1.
   DILUTION FACTOR                              10.60                13.56              11.77               16.11
   HC  CONCENTRATION PPM                        82.                  34.                42.                 33.
   CO  CONCENTRATION PPM                       368.                 162.               125.                139.
   CO2 CONCENTRATION PCT                        1.17                  .79               1.08                 .77
   NOX CONCENTRATION PPM                       36.8                  6.8               30.4                 6.7
   HC  MASS GRAMS                               3.55                 2.52               1.81                2.43
   CO  MASS GRAMS                              32.06                24.47              10.94               20.88
   CO2 MASS GRAMS                            1605.6               1882.4             1480.7              1815.5
   NOX MASS GRAMS                               5.10                 1.62               1.22                1.61

   HC  GRAMS/KM                                  .61                  .40                .31                 .39
   CO  GRAMS/KM                                 5.52                 3.91               1.89                3.35
   CO2 GRAMS/KM                               276.6                301.0              255.8               291.3
   NOX GRAMS/KM                                  .88                  .26                .73                 .26
   FUEL CONSUMPTION BY CB L/100KM              12.26                13.16              11.09               12.71

   RUN TIME               SECONDS              503.                 868.               505.                868.
   MEASURED DISTANCE      KM                    5.80                 6.25               5.79                6.23
   SCF, DRY                                     .975                 .978               .975                .978
         DFC, WET (DRY)                                 .925 ( .912)                          .930 ( .916)
         SCF, WET (DRY)                                1.000 ( .977)                         1.000 ( .977)
         VOL (SCM)                                            204.4                                  204.0
         SAM BLR (SCM)                                          0.00                                   0.00
         KM  (MEASURED)                                        12.06                                  12.02
         FUEL CONSUMPTION L/100KM                              12.73                                  11.93

COMPOSITE RESULTS                                                                                     3-BAG      (4-BAG)
   TEST NUMBER          056FTP                                     CARBON DIOXIDE        G/KM         283.6      ( 280.7)
   BAROMETER     MM HG  731.8                                      FUEL CONSUMPTION      L/100KM      12.41      ( 12.27)
   HUMIDITY      G/KG     9.7                                      HYDROCARBONS (THC)    G/KM           .42      (   .42)
   TEMPERATURE   DEG C   26.1                                      CARBON MONOXIDE       G/KM          3.69      (  3.52)
                                                                   OXIDES OF NITROGEN    G/KM           .52      (   .52)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   058FET   RUN   1                  VEHICLE NO.05                     TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL           DATE    3/ 5/81                   ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                   BAG CART NO.  1                   GASOLINE  EM-470-F
TRANSMISSION M4                              DYNO NO.      3                   ODOMETER 95178. KM(59141. MILES)
                                             CVS NO.   2

BAROMETER 748.92 MM HG(29.17 IN HG)          DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  45. PCT                   ABS. HUMIDITY  8.9 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .94
0 BAG RESULTS
   TEST CYCLE                                     HFET

   BLOWER DIF P MM. H2O(IN. H2O)             756.9 (29.8)
   BLOWER INLET P MM. H2O(IN. H2O)           756.9 (29.8)
   BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)
   BLOWER REVOLUTIONS                          61390.
   TOT FLOW STD. CU. METRES(SCF)             115.1 ( 4063.)
   HC  SAMPLE METER/RANGE/PPM                63.6/ 2/  64.
   HC  BCKGRD METER/RANGE/PPM                 8.0/ 2/   8.
   CO  SAMPLE METER/RANGE/PPM                58.9/12/ 129.
   CO  BCKGRD METER/RANGE/PPM                  .2/12/   0.
   CO2 SAMPLE METER/RANGE/PCT                80.4/ 3/ 1.48
   CO2 BCKGRD METER/RANGE/PCT                 3.5/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM                23.1/ 2/  23.
   NOX BCKGRD METER/RANGE/PPM                  .7/ 2/   1.
   DILUTION FACTOR                              8.95
   HC  CONCENTRATION PPM                        56.
   CO  CONCENTRATION PPM                       123.
   CO2 CONCENTRATION PCT                        1.43
   NOX CONCENTRATION PPM                       22.5
   HC  MASS GRAMS                               3.75
   CO  MASS GRAMS                              16.45
   CO2 MASS GRAMS                            3013.2
   NOX MASS GRAMS                               4.66
   RUN TIME                  SECONDS           766.
         DFC, WET (DRY)                       .888 ( .875)
         SCF, WET (DRY)                      1.000 ( .972)
         VOL (SCM)                             115.1
         SAM BLR (SCM)                          0.00
         KM  (MEASURED)                        16.47

   TEST NUMBER,                                058FET
   BAROMETER,                MM HG              740.9
   HUMIDITY,                 G/KG                 8.9
   TEMPERATURE,              DEG C               24.4
    CARBON DIOXIDE,           G/KM              182.9
   FUEL CONSUMPTION,         L/100KM             7.90

   HYDROCARBONS,             G/KM                 .23
   CARBON MONOXIDE,          G/KM                1.00
   OXIDES OF NITROGEN,       G/KM                 .28
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TABLE D-15. TEST NO. 057 EMISSIONS RESULTS

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                                   FTP   VEHICLE EMISSIONS RESULTS
                                          PROJECT 11-5830-007

TEST NO.   057FTP   RUN   1                 VEHICLE NO.05                           TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL          DATE    3/ 5/81                         ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                  BAG CART NO. 1 / CVS NO.  2             GASOLINE  EM-470-F
TRANSMISSION M4                             DYNO NO.      3                         ODOMETER 95138. KM(59116. MILES)

BAROMETER 740.92 MM HG(29.17 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  30. PCT                  ABS. HUMIDITY  6.0 GM/KG                NOX HUMIDITY CORRECTION FACTOR   .87
BAG RESULTS
  BAG NUMBER                                      1                  2                   3                   4
  DESCRIPTION                               COLD TRANSIENT      STABILIZED         HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             749.3 (29.5)       756.9 (29.8)       749.3 (29.5)        756.9 (29.8)
  BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)       756.9 (29.8)       749.3 (29.5)        756.9 (29.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)       41.1 (106.0)       42.8 (109.0)        41.7 (107.0)
  BLOWER REVOLUTIONS                           40567.             69628.             40515.              69700.
  TOT FLOW STD. CU. METRES(SCF)              76.2 ( 2691.)     131.0 ( 4627.)      76.1 ( 2687.)      131.0 ( 4627.)
  HC   SAMPLE METER/RANGE/PPM               86.9/ 2/  87.      31.3/ 2/  31.      38.8/ 2/  39.       28.3/ 2/  28.
  HC   BCKGRD METER/RANGE/PPM                8.3/ 2/   8.       8.5/ 2/   9.       8.0/ 2/   8.        7.8/ 2/   8.
  CO   SAMPLE METER/RANGE/PPM               86.9/11/ 416.      49.4/12/ 104.      52.0/12/ 111.       47.2/12/  99.
  CO   BCKGRD METER/RANGE/PPM                1.9/11/   6.        .9/12/   2.        .1/12/   0.         .2/12/   0.
  CO2  SAMPLE METER/RANGE/PCT               60.6/ 3/ 1.24      48.1/ 3/  .83      63.7/ 3/ 1.14       48.0/ 3/  .83
  CO2  BCKGRD METER/RANGE/PCT                3.2/ 3/  .05       3.2/ 3/  .05       3.2/ 3/  .05        3.6/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM               45.7/ 2/  46.       7.8/ 2/   8.      38.3/ 2/  38.        8.7/ 2/   9.
  NOX  BCKGRD METER/RANGE/PPM                 .4/ 2/   0.        .4/ 2/   0.        .5/ 2/   1.         .7/ 2/   1.
  DILUTION FACTOR                               10.43              15.88              11.64               15.93
  HC   CONCENTRATION PPM                         79.                23.                31.                 21.
  CO   CONCENTRATION PPM                        397.               100.               107.                 96.
  CO2  CONCENTRATION PCT                        1.19                .78               1.09                 .78
  NOX  CONCENTRATION PPM                        45.3                7.4               37.8                 8.0
  HC   MASS GRAMS                               3.49               1.76               1.30                1.59
  CO   MASS GRAMS                              35.20              15.28               9.50               14.67
  CO2  MASS GRAMS                             1662.2             1882.5             1521.5              1864.1
  NOX  MASS GRAMS                               5.73               1.61               4.77                1.75

  HC   GRAMS/KM                                  .60                .28                .24                 .25
  CO   GRAMS/KM                                 6.10               2.45               1.63                2.35
  CO2  GRAMS/KM                                288.1              302.1              261.7               298.5
  NOX  GRAMS/KM                                  .99                .26                .82                 .28
  FUEL CONSUMPTION BY CB L/100KM               12.79              13.10              11.31               12.93

  RUN TIME                  SECONDS             505.               867.               505.                868.
  MEASURED DISTANCE         KM                  5.77               6.23               5.81                6.24
  SCF, DRY                                      .979               .983               .980                .983
       DFC, WET (DRY)                                  .925 ( .916)                          .929 ( .920)
       SCF, WET (DRY)                                 1.000 ( .981)                         1.000 ( .982)
       VOL (SCM)                                             207.2                                 207.1
       SAM BLR (SCM)                                          0.00                                  0.00
       KM  (MEASURED)                                        12.00                                 12.06
       FUEL CONSUMPTION L/100KM                              12.95                                 12.15
COMPOSITE RESULTS
  TEST NUMBER              057FTP                                                          3-BAG       (4-BAG)
  BAROMETER     MM HG      740.9                      CARBON DIOXIDE        G/KM           288.1      ( 287.1)
  HUMIDITY      G/KG         6.0                      FUEL CONSUMPTION      L/100KM        12.54      ( 12.49)
  TEMPERATURE   DEG C       25.0                      HYDROCARBONS (THC)    G/KM             .34      (   .33)
                                                      CARBON MONOXIDE       G/KM            2.98      (  2.93)
                                                      OXIDES OF NITROGEN    G/KM             .57      (   .57)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5830-007

TEST NO.   057FET   RUN   1                 VEHICLE NO.05                           TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 VOLVO 245DL CAL          DATE    3/ 5/81                         ACTUAL ROAD LOAD   9.5 KW( 12.8 HP)
ENGINE 2.1 L(130. CID) L-4                  BAG CART NO.  1                         GASOLINE  EM-470-F
TRANSMISSION M4                             DYNO NO.      3                         ODOMETER 95162. KM(59131. MILES)
                                            CVS NO.   2

BAROMETER 741.17 MM HG(29.18 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  36. PCT                  ABS. HUMIDITY  7.3 GM/KG                NOX HUMIDITY CORRECTION FACTOR   .90
0 BAG RESULTS
  TEST CYCLE                                   HFET

  BLOWER DIF P MM. H2O(IN. H2O)             756.9 (29.8)
  BLOWER INLET P MM. H2O(IN. H2O)           756.9 (29.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)
  BLOWER REVOLUTIONS                           61429.
  TOT FLOW STD. CU. METRES(SCF)             115.2 ( 4067.)
  HC   SAMPLE METER/RANGE/PPM               65.8/ 2/  66.
  HC   BCKGRD METER/RANGE/PPM                8.0/ 2/   8.
  CO   SAMPLE METER/RANGE/PPM               73.8/12/ 170.
  CO   BCKGRD METER/RANGE/PPM                 .3/12/   1.
  CO2  SAMPLE METER/RANGE/PCT               77.6/ 3/ 1.42
  CO2  BCKGRD METER/RANGE/PCT                3.1/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM               27.2/ 2/  27.
  NOX  BCKGRD METER/RANGE/PPM                 .6/ 2/   1.
  DILUTION FACTOR                               9.29
  HC   CONCENTRATION PPM                         59.
  CO   CONCENTRATION PPM                        163.
  CO2  CONCENTRATION PCT                        1.38
  NOX  CONCENTRATION PPM                        26.7
  HC   MASS GRAMS                               3.90
  CO   MASS GRAMS                              21.88
  CO2  MASS GRAMS                             2905.2
  NOX  MASS GRAMS                               5.28
  RUN TIME                  SECONDS             766.
       DFC, WET (DRY)                       .892 ( .882)
       SCF, WET (DRY)                      1.000 ( .975)
       VOL (SCM)                               115.2
       SAM BLR (SCM)                            0.00
       KM  (MEASURED)                          16.35

  TEST NUMBER.                                057FET
  BAROMETER.                MM HG              741.2
  HUMIDITY.                 G/KG                 7.3
  TEMPERATURE.              DEG C               25.0
   CARBON DIOXIDE.           G/KM              177.7
  FUEL CONSUMPTION.         L/100KM             7.71

  HYDROCARBONS.             G/KM                 .24
  CARBON MONOXIDE.          G/KM                1.34
  OXIDES OF NITROGEN.       G/KM                 .32
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TABLE D-16. TEST NO. 061 EMISSIONS RESULTS

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                    FTP    VEHICLE EMISSIONS RESULTS
                              PROJECT 11-5030-007

TEST NO.    061FTP   RUN   1              VEHICLE NO.06                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL     0 OLDS. CUTLASS         DATE     3/ 9/81                       ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                BAG CART NO. 1 / CVS NO.  2            GASOLINE  EM-470-F
TRANSMISSION A3                           DYNO NO.      3                        ODOMETER 76098. KM(47285. MILES)

BAROMETER 752.09 MM HG(29.61 IN HG)       DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  32. PCT                ABS. HUMIDITY  6.1 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .87
BAG RESULTS
   BAG NUMBER                                    1                 2                  3                 4
   DESCRIPTION                            COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)          762.0 (30.0)      767.1 (30.2)       762.0 (30.0)      767.1 (30.2)
   BLOWER INLET P MM. H2O(IN. H2O)        762.0 (30.0)      767.1 (30.2)       762.0 (30.0)      767.1 (30.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)       42.2 (108.0)      40.6 (105.0)       42.2 (108.0)      41.7 (107.0)
   BLOWER REVOLUTIONS                        40585.            69644.             40516.            69587.
   TOT FLOW STD. CU. METRES(SCF)           77.4 ( 2734.)    133.2 ( 4703.)      77.3 ( 2729.)    132.8 ( 4689.)
   HC   SAMPLE METER/RANGE/PPM            17.6/ 3/ 176.     36.6/ 2/  37.      66.7/ 2/  67.     25.0/ 2/  25.
   HC   BCKGRD METER/RANGE/PPM             1.1/ 3/  11.      9.9/ 2/  10.       9.9/ 2/  10.      9.5/ 2/  10.
   CO   SAMPLE METER/RANGE/PPM            66.0/ 3/1719.     88.5/12/ 216.      73.7/11/ 319.     60.3/12/ 134.
   CO   BCKGRD METER/RANGE/PPM              .7/ 3/   7.      1.0/12/   2.        .3/11/   1.       .5/12/   1.
   CO2 SAMPLE METER/RANGE/PCT             67.6/ 3/ 1.22     44.8/ 3/  .77      60.9/ 3/ 1.08     44.2/ 3/  .76
   CO2 BCKGRD METER/RANGE/PCT              3.1/ 3/  .05      3.2/ 3/  .05       3.1/ 3/  .05      3.8/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM             42.9/ 3/ 127.     44.4/ 2/  44.      37.2/ 3/ 112.     43.2/ 2/  43.
   NOX BCKGRD METER/RANGE/PPM               .1/ 3/   0.       .5/ 2/   1.        .1/ 3/   0.       .6/ 2/   1.
   DILUTION FACTOR                             9.58             16.91              11.98             17.36
   HC   CONCENTRATION PPM                      166.               27.                58.               16.
   CO   CONCENTRATION PPM                     1655.              209.               308.              130.
   CO2 CONCENTRATION PCT                      1.17               .72               1.04               .70
   NOX CONCENTRATION PPM                     128.4              43.9              111.3              42.6
   HC   MASS GRAMS                            7.42              2.10               2.57              1.23
   CO   MASS GRAMS                          149.24             32.43              27.71             20.02
   CO2 MASS GRAMS                           1662.9            1759.0             1468.1            1705.6
   NOX MASS GRAMS                            16.52              9.72              14.30              9.41

   HC   GRAMS/KM                              1.28               .34                .45               .20
   CO   GRAMS/KM                             25.79              5.21               4.82              3.23
   CO2 GRAMS/KM                              287.4             282.8              255.1             275.5
   NOX GRAMS/KM                               2.86              1.56               2.48              1.52
   FUEL CONSUMPTION BY CB L/100KM            14.17             12.47              11.27             12.00

   RUN TIME                SECONDS            505.              868.               505.              863.
   MEASURED DISTANCE       KM                 5.79              6.22               5.75              6.19
   SCF, DRY                                   .978              .983               .980              .983
        DFC, WET (DRY)                              .924 ( .915)                          .933 ( .923)
        SCF, WET (DRY)                             1.000 ( .981)                         1.000 ( .982)
        VOL (SCM)                                          210.6                                 210.1
        SAM BLR (SCM)                                       0.00                                  0.00
        KM  (MEASURED)                                     12.01                                 11.94
        FUEL CONSUMPTION L/100KM                           13.29                                 11.65

COMPOSITE RESULTS
   TEST NUMBER              061FTP
   BAROMETER     MM HG   752.1                                                               3-BAG      (4-BAG)
   HUMIDITY      G/KG      6.1                       CARBON DIOXIDE       G/KM               276.2     ( 274.0)
   TEMPERATURE   DEG C    24.4                       FUEL CONSUMPTION     L/100KM             12.49     ( 12.35)
                                                     HYDROCARBONS (THC)   G/KM                  .56     (   .52)
                                                     CARBON MONOXIDE      G/KM                 9.37     (  8.78)
                                                     OXIDES OF NITROGEN   G/KM                 2.08     (  2.07)
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                    HFET   VEHICLE EMISSIONS RESULTS
                              PROJECT 11-5030-007

TEST NO.    061FET   RUN   1              VEHICLE NO.06                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL     0 OLDS.CUTL ASS         DATE     3/ 9/81                       ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                BAG CART NO.  1                        GASOLINE  EM-470-F
TRANSMISSION A3                           DYNO NO.      3                        ODOMETER 76122. KM(47300. MILES)
                                          CVS NO.   2

BAROMETER 752.35 MM HG(29.62 IN HG)       DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  37. PCT                ABS. HUMIDITY  7.5 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .91
0 BAG RESULTS
   TEST CYCLE                                 HFET

   BLOWER DIF P MM. H2O(IN. H2O)          767.1 (30.2)
   BLOWER INLET P MM. H2O(IN. H2O)        767.1 (30.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)
   BLOWER REVOLUTIONS                        61350.
   TOT FLOW STD. CU. METRES(SCF)          116.8 ( 4123.)
   HC   SAMPLE METER/RANGE/PPM            36.1/ 2/  36.
   HC   BCKGRD METER/RANGE/PPM             8.3/ 2/   8.
   CO   SAMPLE METER/RANGE/PPM            49.4/12/ 104.
   CO   BCKGRD METER/RANGE/PPM              .3/12/   1.
   CO2 SAMPLE METER/RANGE/PCT             86.5/ 3/ 1.60
   CO2 BCKGRD METER/RANGE/PCT              3.2/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM             77.3/ 3/ 232.
   NOX BCKGRD METER/RANGE/PPM               .2/ 3/   1.
   DILUTION FACTOR                             8.20
   HC   CONCENTRATION PPM                      29.
   CO   CONCENTRATION PPM                      99.
   CO2 CONCENTRATION PCT                      1.56
   NOX CONCENTRATION PPM                     231.4
   HC   MASS GRAMS                            1.74
   CO   MASS GRAMS                           13.52
   CO2 MASS GRAMS                           3337.2
   NOX MASS GRAMS                            46.78
   RUN TIME                 SECONDS           765.
        DFC, WET (DRY)                     .079 ( .069)
        SCF, WET (DRY)                    1.000 ( .973)
        VOL (SCM)                             116.8
        SAM BLR (SCM)                          0.00
        KM  (MEASURED)                        16.24

   TEST NUMBER,                              061FET
   BAROMETER,              MM HG              752.3
   HUMIDITY,               G/KG                 7.5
   TEMPERATURE,            DEG C               25.6
    CARBON DIOXIDE,         G/KM              205.6
   FUEL CONSUMPTION,       L/100KM             8.85

   HYDROCARBONS,           G/KM                 .12
   CARBON MONOXIDE,        G/KM                 .83
   OXIDES OF NITROGEN,     G/KM                2.88
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TABLE D-17. TEST NO. 062 EMISSIONS RESULTS

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                                    FTP   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   062FTP   RUN   1             VEHICLE NO.06                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    0 OLDS. CUTLASS        DATE    3/10/81                      ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6              BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470-F
TRANSMISSION A3                         DYNO NO.     3                       ODOMETER 76151. KM(47318. MILES)

BAROMETER 751.33 MM HG(29.58 IN HG)     DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
RELATIVE HUMIDITY  37. PCT              ABS. HUMIDITY  6.6 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .88
BAG RESULTS
   BAG NUMBER                                 1                   2                   3                   4
   DESCRIPTION                         COLD TRANSIENT        STABILIZED         HOT TRANSIENT         STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)        762.0 (30.0)        767.1 (30.2)        762.0 (30.0)        767.1 (30.2)
   BLOWER INLET P MM. H2O(IN. H2O)      762.0 (30.0)        767.1 (30.2)        762.0 (30.0)        767.1 (30.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)     42.8 (109.0)        40.0 (104.0)        42.2 (108.0)        41.1 (106.0)
   BLOWER REVOLUTIONS                      40557.              69674.              40515.              69597.
   TOT FLOW STD. CU. METRES(SCF)         77.2 ( 2727.)      133.2 ( 4705.)       77.2 ( 2726.)      132.8 ( 4690.)
   HC   SAMPLE METER/RANGE/PPM          20.3/ 3/ 203.       30.1/ 2/  30.       45.3/ 2/  45.       19.8/ 2/  20.
   HC   BCKGRD METER/RANGE/PPM           1.0/ 3/  10.        8.9/ 2/   9.        8.7/ 2/   9.        8.6/ 2/   9.
   CO   SAMPLE METER/RANGE/PPM          71.2/ 3/1861.       76.4/12/ 178.       92.3/12/ 229.       49.0/12/ 103.
   CO   BCKGRD METER/RANGE/PPM            .3/ 3/   7.        1.9/12/   4.         .7/12/   1.         .7/12/   1.
   CO2  SAMPLE METER/RANGE/PCT          67.5/ 3/ 1.21       44.0/ 3/  .75       62.6/ 3/ 1.11       44.2/ 3/  .76
   CO2  BCKGRD METER/RANGE/PCT           3.0/ 3/  .05        3.0/ 3/  .05        3.4/ 3/  .05        3.8/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM          44.4/ 3/ 133.       46.4/ 2/  46.       41.8/ 3/ 125.       48.7/ 2/  49.
   NOX  BCKGRD METER/RANGE/PPM            .3/ 3/   1.         .6/ 2/   1.         .2/ 3/   1.         .7/ 2/   1.
   DILUTION FACTOR                          9.48               17.33               11.74               17.44
   HC   CONCENTRATION PPM                  194.                 22.                 37.                 12.
   CO   CONCENTRATION PPM                 1709.                170.                220.                100.
   CO2  CONCENTRATION PCT                  1.17                 .71                1.07                 .70
   NOX  CONCENTRATION PPM                 132.4                45.0               124.9                48.0
   HC   MASS GRAMS                          8.64                1.67                1.66                 .90
   CO   MASS GRAMS                        160.05               26.38               19.80               15.38
   CO2  MASS GRAMS                        1657.5              1730.5              1508.6              1705.7
   NOX  MASS GRAMS                         17.23               10.29               16.24               10.75

   HC   GRAMS/KM                            1.49                 .27                 .29                 .14
   CO   GRAMS/KM                           27.67                4.21                3.41                2.47
   CO2  GRAMS/KM                           285.1               276.4               260.0               273.6
   NOX  GRAMS/KM                            2.96                1.64                2.80                1.72
   FUEL CONSUMPTION BY CB L/100KM          14.23               12.12               11.36               11.66

   RUN TIME              SECONDS           505.                868.                505.                868.
   MEASURED DISTANCE     KM                5.81                6.26                5.80                6.23
   SCF, DRY                                .977                .981                .978                .981
        DFC, WET (DRY)                              .925 ( .914)                         .932 ( .921)
        SCF, WET (DRY)                             1.000 ( .980)                        1.000 ( .980)
        VOL (SCM)                                         210.5                                210.0
        SAM BLR (SCM)                                      0.00                                 0.00
        KM  (MEASURED)                                    12.07                                12.04
        FUEL CONSUMPTION L/100KM                          13.13                                11.62

COMPOSITE RESULTS
   TEST NUMBER              062FTP                                                     3-BAG        (4-BAG)
   BAROMETER       MM HG    751.3                   CARBON DIOXIDE          G/KM       273.7       ( 272.9)
   HUMIDITY        G/KG       6.6                   FUEL CONSUMPTION        L/100KM    12.35       ( 12.27)
   TEMPERATURE     DEG C     23.3                   HYDROCARBONS (THC)      G/KM         .52       (   .49)
                                                    CARBON MONOXIDE         G/KM        8.85       (  8.33)
                                                    OXIDES OF NITROGEN      G/KM        2.23       (  2.26)
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                                    HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   062FET   RUN   1             VEHICLE NO.06                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    0 OLDS. CUTLASS        DATE    3/10/81                      ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6              BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                         DYNO NO.      3                      ODOMETER 76175. KM(47333. MILES)
                                        CVS NO.   2

BAROMETER 751.33 MM HG(29.58 IN HG)     DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  33. PCT              ABS. HUMIDITY  6.5 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .88
0 BAG RESULTS
    TEST CYCLE                                HFET

    BLOWER DIF P MM. H2O(IN. H2O)        767.1 (30.2)
    BLOWER INLET P MM. H2O(IN. H2O)      767.1 (30.2)
    BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)
    BLOWER REVOLUTIONS                      61361.
    TOT FLOW STD. CU. METRES(SCF)        116.6 ( 4118.)
    HC   SAMPLE METER/RANGE/PPM          34.5/ 2/  35.
    HC   BCKGRD METER/RANGE/PPM           8.2/ 2/   8.
    CO   SAMPLE METER/RANGE/PPM          52.6/12/ 112.
    CO   BCKGRD METER/RANGE/PPM            .4/12/   1.
    CO2  SAMPLE METER/RANGE/PCT          88.6/ 3/ 1.65
    CO2  BCKGRD METER/RANGE/PCT           3.6/ 3/  .06
    NOX  SAMPLE METER/RANGE/PPM          83.0/ 3/ 249.
    NOX  BCKGRD METER/RANGE/PPM            .3/ 3/   1.
    DILUTION FACTOR                          8.06
    HC   CONCENTRATION PPM                    27.
    CO   CONCENTRATION PPM                   107.
    CO2  CONCENTRATION PCT                   1.60
    NOX  CONCENTRATION PPM                  240.2
    HC   MASS GRAMS                          1.84
    CO   MASS GRAMS                         14.53
    CO2  MASS GRAMS                        3417.4
    NOX  MASS GRAMS                         48.64
    RUN TIME                SECONDS          765.
         DFC, WET (DRY)                  .876 ( .867)
         SCF, WET (DRY)                 1.000 ( .974)
         VOL (SCM)                          116.6
         SAM BLR (SCM)                       0.00
         KM  (MEASURED)                     16.40

    TEST NUMBER,                           062FET
    BAROMETER,             MM HG            751.3
    HUMIDITY,              G/KG               6.5
    TEMPERATURE,           DEG C             25.0
     CARBON DIOXIDE,        G/KM            208.4
    FUEL CONSUMPTION,      L/100KM           8.97

    HYDROCARBONS,          G/KM               .11
    CARBON MONOXIDE,       G/KM               .89
    OXIDES OF NITROGEN,    G/KM              2.97
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TABLE D-18. TEST NO. 066 EMISSIONS RESULTS

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                                FTP    VEHICLE EMISSIONS RESULTS
                                        PROJECT 11-5830-007

TEST NO.   066FTP   RUN   1               VEHICLE NO.06                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    0 OLDS. CUTLASS          DATE     3/11/81                     ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470-F
TRANSMISSION A3                           DYNO NO.      3                      ODOMETER 76220. KM(47361. MILES)

BAROMETER 749.81 MM HG(29.52 IN HG)       DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  42. PCT                ABS. HUMIDITY  3.1 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .92
BAG RESULTS
  BAG NUMBER                                   1                 2                  3                 4
  DESCRIPTION                            COLD TRANSIENT     STABILIZED        HOT TRANSIENT      STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          762.0 (30.0)      767.1 (30.2)       756.9 (29.8)      767.1 (30.2)
  BLOWER INLET P MM. H2O(IN. H2O)        762.0 (30.0)      767.1 (30.2)       756.9 (29.8)      767.1 (30.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)       42.8 (109.0)      42.2 (108.0)       43.9 (111.0)      42.8 (109.0)
  BLOWER REVOLUTIONS                        40652.            69611.             40555.            69558.
  TOT FLOW STD. CU. METRES(SCF)           77.2 ( 2727.)    132.3 ( 4670.)      76.9 ( 2717.)    132.0 ( 4662.)
  HC   SAMPLE METER/RANGE/PPM            16.2/ 3/ 162.     22.0/ 2/  22.      52.2/ 2/  52.     19.9/ 2/  20.
  HC   BCKGRD METER/RANGE/PPM             1.0/ 3/  10.      8.9/ 2/   9.       8.5/ 2/   9.      8.2/ 2/   8.
  CO   SAMPLE METER/RANGE/PPM            67.4/ 3/1730.     73.2/12/ 169.      74.2/11/ 322.     61.4/12/ 135.
  CO   BCKGRD METER/RANGE/PPM              .1/ 3/   2.       .9/12/   2.        .2/11/   1.       .1/12/   0.
  CO2  SAMPLE METER/RANGE/PCT            71.9/ 3/ 1.30     47.4/ 3/  .82      64.4/ 3/ 1.15     46.0/ 3/  .79
  CO2  BCKGRD METER/RANGE/PCT             3.0/ 3/  .06      3.3/ 3/  .05       3.0/ 3/  .05      3.1/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM            44.0/ 2/  44.     13.4/ 2/  13.      37.7/ 2/  38.     14.1/ 2/  14.
  NOX  BCKGRD METER/RANGE/PPM              .9/ 2/   1.       .7/ 2/   1.        .7/ 2/   1.       .7/ 2/   1.
  DILUTION FACTOR                           9.02              16.03              11.29             16.63
  HC   CONCENTRATION PPM                   153.                14.                44.               12.
  CO   CONCENTRATION PPM                  1669.               162.               310.              131.
  CO2  CONCENTRATION PCT                   1.25                .77               1.11               .75
  NOX  CONCENTRATION PPM                   43.2               12.7               37.1              13.4
  HC   MASS GRAMS                          6.82               1.04               1.97               .93
  CO   MASS GRAMS                        150.09              24.95              27.76             20.18
  CO2  MASS GRAMS                        1769.0             1864.3             1362.3            1803.2
  NOX  MASS GRAMS                          5.07               2.96               5.01              3.12

  HC   GRAMS/KM                            1.17                .17                .34               .15
  CO   GRAMS/KM                           25.70               3.97               4.76              3.21
  CO2  GRAMS/KM                           302.8              296.3              267.8             286.5
  NOX  GRAMS/KM                            1.00                .47                .99               .50
  FUEL CONSUMPTION BY CB L/100KM          14.81              12.93              11.79             12.46

  RUN TIME                SECONDS          506.               868.               506.              868.
  MEASURED DISTANCE       KM               5.04               6.29               5.04              6.29
  SCF, DRY                                 .975               .979               .976              .979
       DFC, WET (DRY)                              .920 ( .907)                         .929 ( .917)
       SCF, WET (DRY)                             1.000 ( .977)                        1.000 ( .978)
       VOL (SCM)                                        209.5                                209.0
       SAM BLR (SCM)                                     0.00                                 0.00
       KM  (MEASURED)                                   12.13                                12.13
       FUEL CONSUMPTION L/100KM                         13.04                                12.14

COMPOSITE RESULTS
  TEST NUMBER           066FTP                                                         3-BAG      (4-BAG)
  BAROMETER    MM HG    749.8                    CARBON DIOXIDE        G/KM            289.8    ( 286.9)
  HUMIDITY     G/KG       8.1                    FUEL CONSUMPTION      L/100KM         13.01    ( 12.37)
  TEMPERATURE  DEG C     24.4                    HYDROCARBONS (THC)    G/KM              .42    (   .41)
                                                 CARBON MONOXIDE       G/KM             8.60    (  8.46)
                                                 OXIDES OF NITROGEN    G/KM              .59    (   .70)


                                HFET   VEHICLE EMISSIONS RESULTS
                                        PROJECT 11-5830-007

TEST NO.   066FET   RUN   1               VEHICLE NO.06                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    0 OLDS. CUTLASS          DATE     3/11/81                     ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                           DYNO NO.      3                      ODOMETER 76244. KM(47376. MILES)
                                          CVS NO.   2

BAROMETER 750.06 MM HG(29.53 IN HG)       DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  39. PCT                ABS. HUMIDITY  7.8 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .91
0 BAG RESULTS
  TEST CYCLE                                  HFET

  BLOWER DIF P MM. H2O(IN. H2O)          762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)        762.0 (30.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)
  BLOWER REVOLUTIONS                        61343.
  TOT FLOW STD. CU. METRES(SCF)          116.5 ( 4112.)
  HC   SAMPLE METER/RANGE/PPM            34.1/ 2/  34.
  HC   BCKGRD METER/RANGE/PPM            10.0/ 2/  11.
  CO   SAMPLE METER/RANGE/PPM            54.8/12/ 118.
  CO   BCKGRD METER/RANGE/PPM              .1/12/   0.
  CO2  SAMPLE METER/RANGE/PCT            91.7/ 3/ 1.71
  CO2  BCKGRD METER/RANGE/PCT             3.2/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM            57.5/ 2/  58.
  NOX  BCKGRD METER/RANGE/PPM              .7/ 2/   1.
  DILUTION FACTOR                           7.75
  HC   CONCENTRATION PPM                    25.
  CO   CONCENTRATION PPM                   112.
  CO2  CONCENTRATION PCT                   1.67
  NOX  CONCENTRATION PPM                   56.9
  HC   MASS GRAMS                          1.66
  CO   MASS GRAMS                         15.24
  CO2  MASS GRAMS                        3563.1
  NOX  MASS GRAMS                         11.56
  RUN TIME                SECONDS          765.
       DFC, WET (DRY)                    .871 ( .860)
       SCF, WET (DRY)                   1.000 ( .972)
       VOL (SCM)                          116.5
       SAM BLR (SCM)                       0.00
       KM  (MEASURED)                     16.52

  TEST NUMBER,                            066FET
  BAROMETER,               MM HG           750.1
  HUMIDITY,                G/KG              7.8
  TEMPERATURE,             DEG C            25.0
   CARBON DIOXIDE,          G/KM           215.7
  FUEL CONSUMPTION,        L/100KM          9.28

  HYDROCARBONS,            G/KM              .10
  CARBON MONOXIDE,         G/KM              .92
  OXIDES OF NITROGEN,      G/KM              .70
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TABLE D-19. TEST NO. 068 EMISSIONS RESULTS

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                                     FTP    VEHICLE EMISSIONS RESULTS
                                              PROJECT 11 5330 007

TEST NO.   068FTP   RUN   1                 VEHICLE NO.06                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 OLDS. CUTLASS            DATE    3/13/81                  ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                  BAG CART NO. 1 / CVS NO.  2      GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                  ODOMETER 76323. KM(47425. MILES)

BAROMETER 746.76 MM HG(29.40 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  36. PCT                  ABS. HUMIDITY  7.2 GM/KG         NOX HUMIDITY CORRECTION FACTOR   .90
BAG RESULTS
   BAG NUMBER                                     1                 2                 3                 4
   DESCRIPTION                              COLD TRANSIENT      STABILIZED     HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)            749.3 (29.5)      762.0 (30.0)      762.0 (30.0)      767.1 (30.2)
   BLOWER INLET P MM. H2O(IN. H2O)          744.2 (29.3)      736.9 (29.0)      762.0 (30.0)      767.1 (30.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)         43.9 (111.0)      37.8 (100.0)      42.8 (109.0)      42.8 (109.0)
   BLOWER REVOLUTIONS                          40577.            67000.            40536.            69697.
   TOT FLOW STD. CU. METRES(SCF)             76.8 ( 2711.)    131.8 ( 4652.)     76.7 ( 2707.)    131.5 ( 4644.)
   HC   SAMPLE METER/RANGE/PPM              23.7/ 3/ 237.     19.5/ 2/  20.     50.0/ 2/  51.     19.2/ 2/  19.
   HC   BCKGRD METER/RANGE/PPM                .8/ 3/   8.      8.0/ 2/   8.      8.4/ 2/   8.      7.7/ 2/   8.
   CO   SAMPLE METER/RANGE/PPM              69.4/ 3/1002.     55.7/12/ 120.     77.7/11/ 346.     60.3/12/ 132.
   CO   BCKGRD METER/RANGE/PPM                .2/ 3/   5.       .5/12/   1.       .2/11/   1.       .4/12/   1.
   CO2  SAMPLE METER/RANGE/PCT              71.6/ 3/ 1.30     44.4/ 3/  .76     64.4/ 3/ 1.15     45.9/ 3/  .79
   CO2  BCKGRD METER/RANGE/PCT               2.7/ 3/  .04      2.9/ 3/  .04      3.2/ 3/  .05      3.5/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM              46.6/ 2/  47.     12.0/ 2/  12.     30.5/ 2/  39.     13.9/ 2/  14.
   NOX  BCKGRD METER/RANGE/PPM                .2/ 2/   0.       .4/ 2/   0.       .5/ 2/   1.       .4/ 2/   0.
   DILUTION FACTOR                              8.97             17.32             11.27             16.69
   HC   CONCENTRATION PPM                       230.               12.               43.               12.
   CO   CONCENTRATION PPM                      1732.              116.              334.              128.
   CO2  CONCENTRATION PCT                       1.26               .72              1.11               .74
   NOX  CONCENTRATION PPM                       46.4              11.6              38.0              13.5
   HC   MASS GRAMS                             10.18               .91              1.91               .91
   CO   MASS GRAMS                            154.84             17.83             29.78             19.62
   CO2  MASS GRAMS                            1771.2            1732.9            1552.6            1777.5
   NOX  MASS GRAMS                              6.11              2.63              5.00              3.05

   HC   GRAMS/KM                                1.75               .14               .33               .14
   CO   GRAMS/KM                               26.64              2.82              5.14              3.13
   CO2  GRAMS/KM                               304.7             274.0             268.1             283.5
   NOX  GRAMS/KM                                1.05               .42               .86               .49
   FUEL CONSUMPTION BY CB L/100KM              15.03             11.91             11.83             12.33

   RUN TIME                   SECONDS           505.              867.              505.              868.
   MEASURED DISTANCE          KM                5.81              6.32              5.79              6.27
   SCF, DRY                                     .976              .981              .978              .981
        DFC, WET (DRY)                                  .922 ( .912)                        .929 ( .919)
        SCF, WET (DRY)                                 1.000 ( .980)                       1.000 ( .980)
        VOL (SCM)                                              208.5                               208.2
        SAM BLR (SCM)                                           0.00                                0.00
        KM  (MEASURED)                                         12.14                               12.06
        FUEL CONSUMPTION L/100KM                               13.40                               12.09

COMPOSITE RESULTS                                                                                3-BAG      (4-BAG)
   TEST NUMBER           068FTP                               CARBON DIOXIDE         G/KM        278.7     ( 281.5)
   BAROMETER     MM HG    746.8                               FUEL CONSUMPTION       L/100KM     12.53     ( 12.65)
   HUMIDITY      G/KG       7.2                               HYDROCARBONS (THC)     G/KM          .53     (   .53)
   TEMPERATURE   DEG C     25.0                               CARBON MONOXIDE        G/KM         8.36     (  8.45)
                                                              OXIDES OF NITROGEN     G/KM          .67     (   .69)
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                                     HFET   VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5330-007

TEST NO.   067FET   RUN   1                 VEHICLE NO.06.                   TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 OLDS. CUTLASS            DATE    3/12/81                  ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                  BAG CART NO.  1                  GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                  ODOMETER 76296. KM(47408. MILES)
                                            CVS NO.   2

BAROMETER 746.76 MM HG(29.40 IN HG)         DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  41. PCT                  ABS. HUMIDITY  7.7 GM/KG         NOX HUMIDITY CORRECTION FACTOR   .91
0 BAG RESULTS
   TEST CYCLE                                   HFET

   BLOWER DIF P MM. H2O(IN. H2O)            767.1 (30.2)
   BLOWER INLET P MM. H2O(IN. H2O)          767.1 (30.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)
   BLOWER REVOLUTIONS                          61378.
   TOT FLOW STD. CU. METRES(SCF)            115.9 ( 4091.)
   HC   SAMPLE METER/RANGE/PPM              31.4/ 2/  31.
   HC   BCKGRD METER/RANGE/PPM               7.9/ 2/   8.
   CO   SAMPLE METER/RANGE/PPM              55.9/12/ 121.
   CO   BCKGRD METER/RANGE/PPM                .4/12/   1.
   CO2  SAMPLE METER/RANGE/PCT              90.3/ 3/ 1.68
   CO2  BCKGRD METER/RANGE/PCT               3.2/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM              53.5/ 2/  54.
   NOX  BCKGRD METER/RANGE/PPM                .3/ 2/   0.
   DILUTION FACTOR                              7.89
   HC   CONCENTRATION PPM                        25.
   CO   CONCENTRATION PPM                       115.
   CO2  CONCENTRATION PCT                       1.64
   NOX  CONCENTRATION PPM                       53.2
   HC   MASS GRAMS                              1.64
   CO   MASS GRAMS                             15.47
   CO2  MASS GRAMS                            3482.8
   NOX  MASS GRAMS                             10.73
   RUN TIME                  SECONDS            765.
        DFC, WET (DRY)                      .873 ( .862)
        SCF, WET (DRY)                     1.000 ( .971)
        VOL (SCM)                              115.9
        SAM BLR (SCM)                           0.00
        KM  (MEASURED)                         16.30

   TEST NUMBER,                                067FET
   BAROMETER,               MM HG               746.8
   HUMIDITY,                G/KG                  7.7
   TEMPERATURE,             DEG C                23.9
    CARBON DIOXIDE,          G/KM               213.6
   FUEL CONSUMPTION,        L/100KM              9.20

   HYDROCARBONS,            G/KM                  .10
   CARBON MONOXIDE,         G/KM                  .95
   OXIDES OF NITROGEN,      G/KM                  .66
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TABLE D-20. TEST NO. 071 EMISSIONS RESULTS

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                                   FTP   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   071FTP   RUN   1                    VEHICLE NO.07                      TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    78 CHEV.MALIBU CAL            DATE     3/16/81                   ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                     BAG CART NO. 1 / CVS NO.  2        GASOLINE  EM-470-F
TRANSMISSION A3                                DYNO NO.      3                    ODOMETER 60473. KM(37576. MILES)

BAROMETER 747.27 MM HG(29.42 IN HG)            DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  32. PCT                     ABS. HUMIDITY  6.2 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .87
BAG RESULTS
   BAG NUMBER                                        1                  2                  3                  4
   DESCRIPTION                                COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)               767.1 (30.2)       774.7 (30.5)       767.1 (30.2)       774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)             767.1 (30.2)       774.7 (30.5)       767.1 (30.2)       774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)            42.2 (108.0)       42.8 (109.0)       42.8 (109.0)       42.8 (109.0)
   BLOWER REVOLUTIONS                             40566.             69563.             40515.             69547.
   TOT FLOW STD. CU. METRES(SCF)                76.8 ( 2712.)     131.4 ( 4640.)      76.6 ( 2705.)     131.4 ( 4639.)
   HC   SAMPLE METER/RANGE/PPM                 10.9/ 3/ 109.      32.5/ 2/  33.      44.7/ 2/  45.      34.4/ 2/  34.
   HC   BCKGRD METER/RANGE/PPM                  1.0/ 3/  10.       9.2/ 2/   9.       9.7/ 2/  10.      10.4/ 2/  10.
   CO   SAMPLE METER/RANGE/PPM                 53.1/ 3/1310.      75.6/12/ 176.      92.5/11/ 464.      86.3/12/ 209.
   CO   BCKGRD METER/RANGE/PPM                   .1/ 3/   2.       1.4/12/   3.        .6/11/   2.       1.3/12/   2.
   CO2 SAMPLE METER/RANGE/PCT                  83.5/ 3/ 1.34      62.3/ 3/ 1.12      73.0/ 3/ 1.44      62.1/ 3/ 1.10
   CO2 BCKGRD METER/RANGE/PCT                   3.9/ 3/  .06       3.4/ 3/  .05       2.9/ 3/  .04       2.6/ 3/  .04
   NOX SAMPLE METER/RANGE/PPM                  38.6/ 2/  39.      10.1/ 2/  10.      16.2/ 2/  16.       9.7/ 2/  10.
   NOX BCKGRD METER/RANGE/PPM                    .5/ 2/   1.        .5/ 2/   1.        .7/ 2/   1.        .7/ 2/   1.
   DILUTION FACTOR                                 7.98              11.76               8.97              11.87
   HC   CONCENTRATION PPM                         100.                24.                36.                25.
   CO   CONCENTRATION PPM                        1256.               160.               444.               200.
   CO2 CONCENTRATION PCT                           1.49               1.07               1.41               1.07
   NOX CONCENTRATION PPM                          38.2                9.6               15.6                9.1
   HC   MASS GRAMS                                  4.44               1.02               1.59               1.88
   CO   MASS GRAMS                                112.25              23.65              39.64              30.63
   CO2 MASS GRAMS                                2095.0             2577.0             1971.4             2569.8
   NOX MASS GRAMS                                   4.88               2.11               1.99               1.98

   HC   GRAMS/KM                                    .76                .29                .27                .30
   CO   GRAMS/KM                                  19.26               4.07               6.77               4.87
   CO2 GRAMS/KM                                  359.5              409.0              336.9              408.6
   NOX GRAMS/KM                                     .84                .33                .34                .31
   FUEL CONSUMPTION BY CB L/100KM                16.74              17.77              14.07              17.01

   RUN TIME                  SECONDS              505.               867.               505.               867.
   MEASURED DISTANCE         KM                    5.83               6.30               5.85               6.29
   SCF, DRY                                        .975               .979               .976               .979
         DFC, WET (DRY)                                  .900 ( .891)                          .906 ( .896)
         SCF, WET (DRY)                                 1.000 ( .978)                         1.000 ( .978)
         VOL (SCM)                                             208.2                                 208.0
         SAM BLR (SCM)                                           0.00                                  0.00
         KM  (MEASURED)                                         12.13                                 12.14
         FUEL CONSUMPTION L/100KM                               17.27                                 16.39

COMPOSITE RESULTS
   TEST NUMBER             071FTP                                                                    3-BAG      (4-BAG)
   BAROMETER     MM HG     747.3                     CARBON DIOXIDE          G/KM                    379.0     ( 378.8)
   HUMIDITY      G/KG        6.2                     FUEL CONSUMPTION        L/100KM                  16.76     (  16.77)
   TEMPERATURE   DEG C      24.4                     HYDROCARBONS (THC)      G/KM                       .30     (    .30)
                                                     CARBON MONOXIDE         G/KM                      7.75     (   8.19)
                                                     OXIDES OF NITROGEN      G/KM                       .44     (    .43)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-007

TEST NO.   071FET   RUN   1                    VEHICLE NO.07                      TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    78 CHEV.MALIBU CAL            DATE     3/16/81                   ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                     BAG CART NO.  1                    GASOLINE  EM-470-F
TRANSMISSION A3                                DYNO NO.      3                    ODOMETER 60498. KM(37592. MILES)
                                               CVS NO.   2

BAROMETER 747.52 MM HG(29.43 IN HG)            DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  28. PCT                     ABS. HUMIDITY  5.7 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .86
0 BAG RESULTS
    TEST CYCLE                                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)               787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)             787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)            43.3 (110.0)
   BLOWER REVOLUTIONS                             61399.
   TOT FLOW STD. CU. METRES(SCF)               115.7 ( 4085.)
   HC   SAMPLE METER/RANGE/PPM                 32.8/ 2/  33.
   HC   BCKGRD METER/RANGE/PPM                 10.9/ 2/  11.
   CO   SAMPLE METER/RANGE/PPM                 76.4/12/ 178.
   CO   BCKGRD METER/RANGE/PPM                   .8/12/   1.
   CO2 SAMPLE METER/RANGE/PCT                  45.3/ 2/ 1.99
   CO2 BCKGRD METER/RANGE/PCT                   1.3/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM                  33.2/ 2/  33.
   NOX BCKGRD METER/RANGE/PPM                    .1/ 2/   0.
   DILUTION FACTOR                                 6.67
   HC   CONCENTRATION PPM                          24.
   CO   CONCENTRATION PPM                         168.
   CO2 CONCENTRATION PCT                           1.95
   NOX CONCENTRATION PPM                          33.1
   HC   MASS GRAMS                                  1.57
   CO   MASS GRAMS                                 22.68
   CO2 MASS GRAMS                                4127.1
   NOX MASS GRAMS                                   6.29
   RUN TIME                  SECONDS              766.
         DFC, WET (DRY)                        .850 ( .843)
         SCF, WET (DRY)                       1.000 ( .973)
         VOL (SCM)                              115.7
         SAM BLR (SCM)                            0.00
         KM  (MEASURED)                          16.48

  TEST NUMBER,                                  071FET
  BAROMETER,               MM HG                747.5
  HUMIDITY,                G/KG                   5.7
  TEMPERATURE,             DEG C                 25.6
   CARBON DIOXIDE,          G/KM                250.5
  FUEL CONSUMPTION,        L/100KM              10.80

  HYDROCARBONS,            G/KM                   .10
  CARBON MONOXIDE,         G/KM                  1.38
  OXIDES OF NITROGEN,      G/KM                   .38
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TABLE D-21. TEST NO. 072 EMISSIONS RESULTS

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                                      FTP    VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5830 007

TEST NO.   072FTP   RUN   2                VEHICLE NO.07                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 CHEV.MALIBU CAL         DATE     3/10/81                       ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                 BAG CART NO. 1 / CVS NO.  2            GASOLINE  EM-470-F
TRANSMISSION A3                            DYNO NO.       3                       ODOMETER 60537. KM(37616. MILES)

BAROMETER 736.85 MM HG(29.01 IN HG)        DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
RELATIVE HUMIDITY  27. PCT                 ABS. HUMIDITY  5.0 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .84
BAG RESULTS
   BAG NUMBER                                    1                  2                    3                  4
   DESCRIPTION                             COLD TRANSIENT       STABILIZED         HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)           774.7 (30.5)       782.3 (30.8)       777.2 (30.6)       787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)         767.1 (30.2)       774.7 (30.5)       767.1 (30.2)       777.2 (30.6)
   BLOWER INLET TEMP. DEG. C(DEG. F)        43.3 (110.0)       42.8 (109.0)       43.1 (109.5)       43.3 (110.0)
   BLOWER REVOLUTIONS                         40543.             69609.             40401.             69527.
   TOT FLOW STD. CU. METRES(SCF)            75.4 ( 2662.)     129.4 ( 4570.)      75.3 ( 2659.)     129.1 ( 4558.)
   HC   SAMPLE METER/RANGE/PPM             12.9/ 3/ 129.      32.8/ 2/  33.      45.3/ 2/  45.      32.5/ 2/  33.
   HC   BCKGRD METER/RANGE/PPM              1.3/ 3/  13.       8.5/ 2/   9.       8.1/ 2/   8.       8.6/ 2/   9.
   CO   SAMPLE METER/RANGE/PPM             50.3/ 3/1231.      91.7/12/ 227.      94.7/11/ 404.      89.3/12/ 219.
   CO   BCKGRD METER/RANGE/PPM               .1/ 3/   2.        .2/12/   0.        .1/11/   0.        .1/12/   0.
   CO2  SAMPLE METER/RANGE/PCT             85.2/ 3/ 1.58      62.3/ 3/ 1.11      78.0/ 3/ 1.43      61.0/ 3/ 1.08
   CO2  BCKGRD METER/RANGE/PCT              2.5/ 3/  .04       2.8/ 3/  .04       3.1/ 3/  .05       2.5/ 3/  .04
   NOX  SAMPLE METER/RANGE/PPM             43.4/ 2/  43.      10.6/ 2/  11.      17.0/ 2/  17.      10.2/ 2/  10.
   NOX  BCKGRD METER/RANGE/PPM               .2/ 2/   0.        .4/ 2/   0.        .5/ 2/   1.        .4/ 2/   0.
   DILUTION FACTOR                              7.04               11.82               9.06              12.10
   HC   CONCENTRATION PPM                      118.                25.                38.                25.
   CO   CONCENTRATION PPM                     1181.               220.               466.               212.
   CO2  CONCENTRATION PCT                       1.54               1.07               1.39               1.05
   NOX  CONCENTRATION PPM                      43.2               10.2               16.6                9.8
   HC   MASS GRAMS                              5.12               1.07               1.65               1.03
   CO   MASS GRAMS                            103.60              33.12              40.85              31.90
   CO2  MASS GRAMS                           2132.2             2534.7             1911.2             2476.5
   NOX  MASS GRAMS                              5.25               2.13               2.01               2.04

   HC   GRAMS/KM                                 .89                .30                .29                .30
   CO   GRAMS/KM                               18.09               5.36               7.11               5.15
   CO2  GRAMS/KM                              371.9              410.5              332.6              399.6
   NOX  GRAMS/KM                                 .92                .35                .35                .33
   FUEL CONSUMPTION BY CB L/100KM              17.21              17.92              14.71              17.44

   RUN TIME                SECONDS            505.               868.               505.               868.
   MEASURED DISTANCE       KM                  5.73               6.17               5.75               6.20
   SCF, DRY                                    .977               .981               .978               .981
        DFC, WET (DRY)                                 .900 ( .892)                          .907 ( .899)
        SCF, WET (DRY)                                1.000 ( .979)                         1.000 ( .980)
        VOL (SCM)                                             204.8                                 204.4
        SAM BLR (SCM)                                           0.00                                  0.00
        KM  (MEASURED)                                         11.91                                 11.94
        FUEL CONSUMPTION L/100KM                               17.58                                 16.13

COMPOSITE RESULTS                                                                                3-BAG       (4-BAG)
   TEST NUMBER             072FTP                                CARBON DIOXIDE       G/KM       381.1      ( 377.9)
   BAROMETER       MM HG   736.9                                 FUEL CONSUMPTION     L/100KM    16.39      ( 16.75)
   HUMIDITY        G/KG      5.0                                 HYDROCARBONS (THC)   G/KM         .42      (   .42)
   TEMPERATURE     DEG C    23.3                                 CARBON MONOXIDE      G/KM        8.43      (  8.41)
                                                                 OXIDES OF NITROGEN   G/KM         .46      (   .46)
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                                      HFET   VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5830 007

TEST NO.   072FET   RUN   2                VEHICLE NO.07                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 CHEV.MALIBU CAL         DATE     3/10/81                       ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                 BAG CART NO.  1                        GASOLINE  EM-470-F
TRANSMISSION A3                            DYNO NO.      3                        ODOMETER 60561. KM(37631. MILES)
                                           CVS NO.   2

BAROMETER 737.11 MM HG(29.02 IN HG)        DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  26. PCT                 ABS. HUMIDITY  5.1 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .84
0 BAG RESULTS
   TEST CYCLE                                 HFET

   BLOWER DIF P MM. H2O(IN. H2O)           800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)         792.5 (31.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)        43.3 (110.0)
   BLOWER REVOLUTIONS                         61323.
   TOT FLOW STD. CU. METRES(SCF)           113.7 ( 4014.)
   HC   SAMPLE METER/RANGE/PPM             34.8/ 2/  35.
   HC   BCKGRD METER/RANGE/PPM              7.0/ 2/   7.
   CO   SAMPLE METER/RANGE/PPM             82.1/12/ 196.
   CO   BCKGRD METER/RANGE/PPM               .1/12/   0.
   CO2  SAMPLE METER/RANGE/PCT             44.0/ 2/ 1.92
   CO2  BCKGRD METER/RANGE/PCT              1.2/ 2/  .04
   NOX  SAMPLE METER/RANGE/PPM             31.0/ 2/  32.
   NOX  BCKGRD METER/RANGE/PPM               .3/ 2/   0.
   DILUTION FACTOR                              6.90
   HC   CONCENTRATION PPM                      29.
   CO   CONCENTRATION PPM                     107.
   CO2  CONCENTRATION PCT                       1.08
   NOX  CONCENTRATION PPM                      31.5
   HC   MASS GRAMS                              1.39
   CO   MASS GRAMS                             24.69
   CO2  MASS GRAMS                           3918.6
   NOX  MASS GRAMS                              5.79
   RUN TIME                SECONDS            765.
        DFC, WET (DRY)                     .855 ( .848)
        SCF, WET (DRY)                    1.000 ( .974)
        VOL (SCM)                             113.7
        SAM BLR (SCM)                           0.00
        KM  (MEASURED)                         16.27

   TEST NUMBER,                               072FET
   BAROMETER,              MM HG              737.1
   HUMIDITY,               G/KG                 5.1
   TEMPERATURE,            DEG C               24.4
    CARBON DIOXIDE,         G/KM              240.9
   FUEL CONSUMPTION,       L/100KM             10.40

   HYDROCARBONS,           G/KM                 .12
   CARBON MONOXIDE,        G/KM                1.52
   OXIDES OF NITROGEN,     G/KM                 .36
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TABLE D-22. TEST NO. 076 EMISSIONS RESULTS

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                                        FTP    VEHICLE EMISSIONS RESULTS
                                                 PROJECT 11-5830-007

TEST NO.   076FTP    RUN   1                     VEHICLE NO.07                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    78 CHEV.MALIBU CAL              DATE     3/19/81                       ACTUAL ROAD LOAD    8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                       BAG CART NO. 1 / CVS NO.  2            GASOLINE  EM-470-F
TRANSMISSION A3                                  DYNO NO.       3                       ODOMETER 60597. KM(37653. MILES)

BAROMETER 747.70 MM HG(29.44 IN HG)              DRY BULB TEMP. 22.8 DEG C(73.0 DEG F)
RELATIVE HUMIDITY  14. PCT                       ABS. HUMIDITY  2.4 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .78
BAG RESULTS
   BAG NUMBER                                          1                  2                  3                  4
   DESCRIPTION                                  COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)                787.4 (31.0)       792.5 (31.2)       762.3 (30.0)       787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)              762.3 (30.0)       787.4 (31.0)       774.7 (30.5)       762.3 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)             43.3 (110.0)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                              40362.             69608.             40491.             69490.
   TOT FLOW STD. CU. METRES(SCF)                76.5 ( 2702.)      131.2 ( 4633.)      76.5 ( 2699.)      131.1 ( 4628.)
   HC   SAMPLE METER/RANGE/PPM                  11.7/ 3/ 117.      32.6/ 2/  33.      45.3/ 2/  45.      36.1/ 2/  36.
   HC   BCKGRD METER/RANGE/PPM                    .6/ 3/   6.       8.0/ 2/   9.      10.7/ 2/  11.      11.0/ 2/  11.
   CO   SAMPLE METER/RANGE/PPM                  40.5/ 3/1102.      66.0/12/ 140.      78.5/11/ 352.      65.5/12/ 147.
   CO   BCKGRD METER/RANGE/PPM                    .1/ 3/   2.        .8/12/   1.        .6/11/   2.        .9/12/   2.
   CO2  SAMPLE METER/RANGE/PCT                  85.4/ 3/ 1.58      60.4/ 3/ 1.07      76.8/ 3/ 1.40      59.5/ 3/ 1.05
   CO2  BCKGRD METER/RANGE/PCT                   2.9/ 3/  .04       3.3/ 3/  .05       3.0/ 3/  .05       3.2/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM                  39.5/ 2/  40.      10.7/ 2/  11.      17.4/ 2/  17.      11.2/ 2/  11.
   NOX  BCKGRD METER/RANGE/PPM                    .1/ 2/   0.        .1/ 2/   0.        .1/ 2/   0.        .3/ 2/   0.
   DILUTION FACTOR                                  7.85              12.31               9.29              12.51
   HC   CONCENTRATION PPM                          110.                25.                34.                26.
   CO   CONCENTRATION PPM                         1130.               143.               339.               141.
   CO2  CONCENTRATION PCT                          1.54               1.02               1.36               1.01
   NOX  CONCENTRATION PPM                          39.4               10.6               17.3               10.9
   HC   MASS GRAMS                                  4.85               1.85               1.50               1.96
   CO   MASS GRAMS                                101.41              21.82              30.17              21.57
   CO2  MASS GRAMS                                2161.9             2460.9             1907.1             2418.7
   NOX  MASS GRAMS                                  4.53               2.09               1.99               2.15

   HC   GRAMS/KM                                     .83                .30                .27                .31
   CO   GRAMS/KM                                   17.37               3.48               5.17               3.43
   CO2  GRAMS/KM                                   370.2              393.0              326.5              384.9
   NOX  GRAMS/KM                                     .78                .33                .34                .34
   FUEL CONSUMPTION BY CB L/100KM                  17.08              17.05              14.32              16.70

   RUN TIME                      SECONDS          505.               866.               505.               867.
   MEASURED DISTANCE             KM               5.84               6.26               5.84               6.28
   SCF, DRY                                       .901               .906               .933               .906
       DFC, WET (DRY)                                    .902 ( .898)                          .910 ( .906)
       SCF, WET (DRY)                                  1.000 ( .984)                         1.000 ( .985)
       VOL (SCM)                                               207.7                                 207.5
       SAM BLR (SCM)                                            0.00                                  0.00
       KM  (MEASURED)                                          12.10                                 12.12
       FUEL CONSUMPTION L/100KM                                17.06                                 15.55

COMPOSITE RESULTS                                                                                      3-BAG       (4-BAG)
   TEST NUMBER            076FTP                                  CARBON DIOXIDE       G/KM        370.0       ( 367.6)
   BAROMETER      MM HG   747.8                                   FUEL CONSUMPTION     L/100KM     16.30       ( 16.20)
   HUMIDITY       G/KG      2.4                                   HYDROCARBONS (THC)   G/KM          .40       (   .40)
   TEMPERATURE    DEG C    22.8                                   CARBON MONOXIDE      G/KM         6.82       (  6.81)
                                                                  OXIDES OF NITROGEN   G/KM          .43       (   .43)
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                                        HFET   VEHICLE EMISSIONS RESULTS
                                                 PROJECT 11 5830-000

TEST NO.   076FET    RUN   1                     VEHICLE NO.07                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    78 CHEV.MALIBU CAL              DATE     3/19/81                       ACTUAL ROAD LOAD    8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                       BAG CART NO.   1                       GASOLINE  EM-470-F
TRANSMISSION A3                                  DYNO NO.       3                       ODOMETER 60621. KM(37668. MILES)
                                                 CVS NO.    2

BAROMETER 747.27 MM HG(29.42 IN HG)              DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  16. PCT                       ABS. HUMIDITY  3.5 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .81
0 BAG RESULTS
   TEST CYCLE                                      HFET

   BLOWER DIF P MM. H2O(IN. H2O)                800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)              792.5 (31.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)             43.3 (110.0)
   BLOWER REVOLUTIONS                              61259.
   TOT FLOW STD. CU. METRES(SCF)               115.3 ( 4070.)
   HC   SAMPLE METER/RANGE/PPM                  37.2/ 2/  37.
   HC   BCKGRD METER/RANGE/PPM                  13.6/ 2/  14.
   CO   SAMPLE METER/RANGE/PPM                  66.3/12/ 149.
   CO   BCKGRD METER/RANGE/PPM                    .3/12/   1.
   CO2  SAMPLE METER/RANGE/PCT                  45.6/ 2/ 2.00
   CO2  BCKGRD METER/RANGE/PCT                   1.6/ 3/  .02
   NOX  SAMPLE METER/RANGE/PPM                  30.1/ 2/  30.
   NOX  BCKGRD METER/RANGE/PPM                    .4/ 2/   0.
   DILUTION FACTOR                                  6.63
   HC   CONCENTRATION PPM                           26.
   CO   CONCENTRATION PPM                          142.
   CO2  CONCENTRATION PCT                          1.98
   NOX  CONCENTRATION PPM                          29.8
   HC   MASS GRAMS                                  1.71
   CO   MASS GRAMS                                 19.03
   CO2  MASS GRAMS                                4183.8
   NOX  MASS GRAMS                                  5.30
   RUN TIME                      SECONDS           765.
        DFC, WET (DRY)                          .849 ( .845)
        SCF, WET (DRY)                         1.000 ( .976)
        VOL (SCM)                                  115.3
        SAM BLR (SCM)                               0.00
        KM  (MEASURED)                             16.48

   TEST NUMBER,                                   076FET
   BAROMETER,             MM HG                    747.3
   HUMIDITY,              G/KG                       3.5
   TEMPERATURE,           DEG C                     26.7
    CARBON DIOXIDE,        G/KM                    253.9
   FUEL CONSUMPTION,      L/100KM                  10.93

   HYDROCARBONS,          G/KM                       .10
   CARBON MONOXIDE,       G/KM                      1.15
   OXIDES OF NITROGEN,    G/KM                       .32
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TABLE D-23. TEST NO. 078 EMISSIONS RESULTS

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                                          FTP VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5830 010

TEST NO.   078FTP   RUN   1                       VEHICLE NO.07                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 CHEV.MALIBU CAL                DATE    4/ 7/81                        ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                        BAG CART NO. 1 / CVS NO.  2            GASOLINE  EM-470-F
TRANSMISSION A3                                   DYNO NO.      3                        ODOMETER 61857. KM(38435. MILES)

BAROMETER 742.70 MM HG(29.24 IN HG)               DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  49. PCT                        ABS. HUMIDITY 10.0 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
   BAG NUMBER                                          1                   2                   3                   4
   DESCRIPTION                                  COLD TRANSIENT        STABILIZED          HOT TRANSIENT         STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)                787.4 (31.0)        792.5 (31.2)        787.4 (31.0)        792.5 (31.2)
   BLOWER INLET P MM. H2O(IN. H2O)              782.3 (30.8)        787.4 (31.0)        782.3 (30.8)        787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)             43.3 (110.0)        43.3 (110.0)        43.3 (110.0)        43.3 (110.0)
   BLOWER REVOLUTIONS                              40523.              69548.              40493.              69474.
   TOT FLOW STD. CU. METRES(SCF)                 75.9 ( 2679.)      130.1 ( 4594.)       75.8 ( 2677.)      130.0 ( 4589.)
   HC   SAMPLE METER/RANGE/PPM                  12.6/ 3/ 126.       34.4/ 2/  34.       64.6/ 2/  65.       33.6/ 2/  34.
   HC   BCKGRD METER/RANGE/PPM                   1.4/ 3/  14.       14.1/ 2/  14.       14.0/ 2/  14.       15.0/ 2/  15.
   CO   SAMPLE METER/RANGE/PPM                  55.7/ 3/1334.       71.5/12/ 164.       23.8/ 3/ 550.       74.2/12/ 171.
   CO   BCKGRD METER/RANGE/PPM                    .1/ 3/   2.        1.5/12/   3.         .1/ 3/   2.        1.2/12/   2.
   CO2  SAMPLE METER/RANGE/PCT                  86.8/ 3/ 1.61       59.9/ 3/ 1.06       75.0/ 3/ 1.37       57.7/ 3/ 1.02
   CO2  BCKGRD METER/RANGE/PCT                   2.9/ 3/  .04        3.3/ 3/  .05        2.8/ 3/  .04        3.4/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM                  26.9/ 2/  27.       11.5/ 2/  12.       16.1/ 2/  16.       11.1/ 2/  11.
   NOX  BCKGRD METER/RANGE/PPM                    .6/ 2/   1.         .8/ 2/   1.         .7/ 2/   1.        1.2/ 2/   1.
   DILUTION FACTOR                                  7.63               12.41                9.40               12.92
   HC   CONCENTRATION PPM                          114.                 21.                 52.                 20.
   CO   CONCENTRATION PPM                         1318.                155.                525.                163.
   CO2  CONCENTRATION PCT                          1.57                1.01                1.33                 .97
   NOX  CONCENTRATION PPM                          26.4                10.8                15.5                10.0
   HC   MASS GRAMS                                 4.98                1.61                2.28                1.48
   CO   MASS GRAMS                               116.37               23.49               46.35               24.72
   CO2  MASS GRAMS                               2184.4              2416.5              1843.4              2306.3
   NOX  MASS GRAMS                                 3.73                2.61                2.19                2.42

   HC   GRAMS/KM                                    .86                 .26                 .39                 .24
   CO   GRAMS/KM                                  20.08                3.76                7.97                3.94
   CO2  GRAMS/KM                                  376.9               387.1               316.8               368.1
   NOX  GRAMS/KM                                    .64                 .42                 .38                 .39
   FUEL CONSUMPTION BY CB L/100KM                 17.55               16.81               14.11               16.01

   RUN TIME                 SECONDS                505.                867.                505.                867.
   MEASURED DISTANCE        KM                     5.80                6.24                5.82                6.27
   SCF, DRY                                        .969                .974                .972                .975
          DFC, WET (DRY)                                    .901 ( .887)                            .912 ( .897)
          SCF, WET (DRY)                                   1.000 ( .972)                           1.000 ( .974)
          VOL (SCM)                                               206.0                                   205.8
          SAM BLR (SCM)                                            0.00                                    0.00
          KM  (MEASURED)                                          12.04                                   12.08
          FUEL CONSUMPTION L/100KM                                17.17                                   15.09
                                                                                                  3-BAG         (4-BAG)
COMPOSITE RESULTS                                                     CARBON DIOXIDE       G/KM      365.7        ( 360.1)
   TEST NUMBER               078FTP                                   FUEL CONSUMPTION     L/100KM   16.22        ( 15.99)
   BAROMETER     MM HG    742.7                                       HYDROCARBONS (THC)   G/KM        .42        (   .41)
   HUMIDITY      G/KG      10.0                                       CARBON MONOXIDE      G/KM       8.30        (  8.35)
   TEMPERATURE   DEG C     25.0                                       OXIDES OF NITROGEN   G/KM        .45        (   .44)
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                                          HFET   VEHICLE EMISSIONS RESULTS
                                                  PROJECT 11-5830-010

TEST NO.   078FET   RUN   1                       VEHICLE NO.07                          TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 CHEV.MALIBU CAL                DATE    4/ 7/81                        ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 5.0 L(305. CID) V-8                        BAG CART NO.  1                        GASOLINE  EM-470-F
TRANSMISSION A3                                   DYNO NO.      3                        ODOMETER 61891. KM(38451. MILES)
                                                  CVS NO.   2

BAROMETER 741.93 MM HG(29.21 IN HG)               DRY BULB TEMP. 27.2 DEG C(81.0 DEG F)
RELATIVE HUMIDITY  45. PCT                        ABS. HUMIDITY 10.4 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .99
0 BAG RESULTS
   TEST CYCLE                                        HFET

   BLOWER DIF P MM. H2O(IN. H2O)                  807.7 (31.8)
   BLOWER INLET P MM. H2O(IN. H2O)                800.1 (31.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)               43.3 (110.0)
   BLOWER REVOLUTIONS                                61287.
   TOT FLOW STD. CU. METRES(SCF)                  114.3 ( 4036.)
   HC   SAMPLE METER/RANGE/PPM                     53.3/ 2/  53.
   HC   BCKGRD METER/RANGE/PPM                     14.5/ 2/  15.
   CO   SAMPLE METER/RANGE/PPM                     65.5/11/ 267.
   CO   BCKGRD METER/RANGE/PPM                       .5/11/   1.
   CO2  SAMPLE METER/RANGE/PCT                     45.8/ 2/ 2.01
   CO2  BCKGRD METER/RANGE/PCT                      1.5/ 2/  .05
   NOX  SAMPLE METER/RANGE/PPM                     30.9/ 2/  31.
   NOX  BCKGRD METER/RANGE/PPM                      1.1/ 2/   1.
   DILUTION FACTOR                                     6.55
   HC   CONCENTRATION PPM                               41.
   CO   CONCENTRATION PPM                              252.
   CO2  CONCENTRATION PCT                              1.97
   NOX  CONCENTRATION PPM                              30.0
   HC   MASS GRAMS                                     2.70
   CO   MASS GRAMS                                    33.53
   CO2  MASS GRAMS                                   4119.6
   NOX  MASS GRAMS                                     6.49
   RUN TIME                 SECONDS                    765.
          DFC, WET (DRY)                           .847 ( .835)
          SCF, WET (DRY)                          1.000 ( .967)
          VOL (SCM)                                   114.3
          SAM BLR (SCM)                                0.00
          KM  (MEASURED)                              16.39

   TEST NUMBER,                                      078FET
   BAROMETER,               MM HG                     741.9
   HUMIDITY,                G/KG                       10.4
   TEMPERATURE,             DEG C                      27.2
    CARBON DIOXIDE,          G/KM                     251.3
   FUEL CONSUMPTION,        L/100KM                   10.88

   HYDROCARBONS,            G/KM                        .16
   CARBON MONOXIDE,         G/KM                       2.05
   OXIDES OF NITROGEN,      G/KM                        .40
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TABLE D-24. TEST NO. 081 EMISSIONS RESULTS

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                              FTP    VEHICLE EMISSIONS RESULTS
                                       PROJECT 11 5030-007

TEST NO.   001FTP   RUN   1            VEHICLE NO.00                        TEST WEIGHT  1500. KG( 3500. LBS)
VEHICLE MODEL    70 MONTE CARLO        DATE     3/23/81                     ACTUAL ROAD LOAD    8.0 KW( 10.7 HP)
ENGINE 3.0 L(231. CID) V-6             BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470-F
TRANSMISSION A3                        DYNO NO.       3                     ODOMETER ****** KM(67467. MILES)

BAROMETER 740.54 MM HG(29.47 IN HG)    DRY BULB TEMP. 25.6 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  25. PCT             ABS. HUMIDITY  5.1 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .84
BAG RESULTS
  BAG NUMBER                               1                 2                   3                  4
  DESCRIPTION                        COLD TRANSIENT      STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)       702.3 (30.0)      792.5 (31.2)       787.4 (31.0)       792.5 (31.2)
  BLOWER INLET P MM. H2O(IN. H2O)     774.7 (30.5)      787.4 (31.0)       777.2 (30.6)       787.4 (31.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)    43.3 (110.0)      41.7 (107.0)       43.3 (110.0)       43.1 (109.5)
  BLOWER REVOLUTIONS                     40629.            69527.             40475.             69544.
  TOT FLOW STD. CU. METRES(SCF)        76.8 ( 2712.)    131.6 ( 4646.)      76.5 ( 2700.)     131.3 ( 4636.)
  HC   SAMPLE METER/RANGE/PPM           9.4/ 3/  94.     12.9/ 2/  13.      55.4/ 2/  55.      12.4/ 2/  12.
  HC   BCKGRD METER/RANGE/PPM            .8/ 3/   8.      8.8/ 2/   9.       8.3/ 2/   8.       8.1/ 2/   8.
  CO   SAMPLE METER/RANGE/PPM          35.2/ 3/ 831.      8.9/13/   8.      85.2/13/  85.       3.0/13/   3.
  CO   BCKGRD METER/RANGE/PPM            .2/ 3/   5.       .5/13/   0.        .1/13/   0.        .1/13/   0.
  CO2  SAMPLE METER/RANGE/PCT          70.9/ 3/ 1.28     48.6/ 3/  .84      63.3/ 3/ 1.13      48.0/ 3/  .83
  CO2  BCKGRD METER/RANGE/PCT           3.3/ 3/  .05      3.8/ 3/  .06       3.6/ 3/  .06       3.7/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM          38.9/ 3/ 117.     46.4/ 2/  46.      38.2/ 3/ 115.      44.7/ 2/  45.
  NOX  BCKGRD METER/RANGE/PPM            .1/ 3/   0.       .5/ 2/   1.        .1/ 3/   0.        .5/ 2/   1.
  DILUTION FACTOR                          9.76             15.91              11.73              16.14
  HC   CONCENTRATION PPM                   87.                5.                48.                 5.
  CO   CONCENTRATION PPM                  800.                7.                82.                 3.
  CO2  CONCENTRATION PCT                  1.24               .79               1.08                .78
  NOX  CONCENTRATION PPM                 116.4              45.9              114.3               44.2
  HC   MASS GRAMS                         3.84               .35               2.11                .36
  CO   MASS GRAMS                        71.53              1.14               7.34                .39
  CO2  MASS GRAMS                       1739.6            1892.5             1509.7             1864.0
  NOX  MASS GRAMS                        14.43              9.76              14.11               9.37

  HC   GRAMS/KM                            .67               .06                .37                .06
  CO   GRAMS/KM                          12.39               .18               1.27                .06
  CO2  GRAMS/KM                          301.4             303.1              262.2              300.5
  NOX  GRAMS/KM                           2.50              1.56               2.45               1.51
  FUEL CONSUMPTION BY CB L/100KM         13.77             12.96              11.32              12.84

  RUN TIME              SECONDS           506.              867.               505.               860.
  MEASURED DISTANCE     KM                5.77              6.24               5.76               6.20
  SCF, DRY                                .900              .984               .982               .984
       DFC, WET (DRY)                            .923 ( .915)                         .929 ( .922)
       SCF, WET (DRY)                           1.000 ( .983)                        1.000 ( .983)
       VOL (SCM)                                      208.4                                207.8
       SAM BLR (SCM)                                   0.00                                 0.00
       KM  (MEASURED)                                 12.01                                11.96
       FUEL CONSUMPTION L/100KM                       13.36                                12.11

COMPOSITE RESULTS                                                                           3-BAG      (4-BAG)
  TEST NUMBER             001FTP                        CARBON DIOXIDE         G/KM         291.6     ( 290.8)
  BAROMETER     MM HG     740.5                         FUEL CONSUMPTION       L/100KM      12.68     ( 12.65)
  HUMIDITY      G/KG        5.1                         HYDROCARBONS (THC)     G/KM           .27     (   .27)
  TEMPERATURE   DEG C      25.6                         CARBON MONOXIDE        G/KM          3.00     (  2.97)
                                                        OXIDES OF NITROGEN     G/KM          2.00     (  1.99)
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                              HFET   VEHICLE EMISSIONS RESULTS
                                       PROJECT 11-5030-007

TEST NO.   001FET   RUN   1            VEHICLE NO.00                        TEST WEIGHT  1500. KG( 3500. LBS)
VEHICLE MODEL    70 MONTE CARLO        DATE     3/23/81                     ACTUAL ROAD LOAD    8.0 KW( 10.7 HP)
ENGINE 3.0 L(231. CID) V-6             BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                        DYNO NO.      3                      ODOMETER ****** KM(67402. MILES)
                                       CVS NO.   2

BAROMETER 747.70 MM HG(29.44 IN HG)    DRY BULB TEMP. 25.6 DEG C(70.0 DEG F)
RELATIVE HUMIDITY  20. PCT             ABS. HUMIDITY  5.7 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .86
0 BAG RESULTS
   TEST CYCLE                               HFET

   BLOWER DIF P MM. H2O(IN. H2O)        800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)      787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)     43.9 (111.0)
   BLOWER REVOLUTIONS                      61321.
   TOT FLOW STD. CU. METRES(SCF)        115.4 ( 4076.)
   HC   SAMPLE METER/RANGE/PPM           23.3/ 2/  23.
   HC   BCKGRD METER/RANGE/PPM            7.9/ 2/   8.
   CO   SAMPLE METER/RANGE/PPM           16.8/13/  15.
   CO   BCKGRD METER/RANGE/PPM             .2/13/   0.
   CO2  SAMPLE METER/RANGE/PCT           82.5/ 3/ 1.52
   CO2  BCKGRD METER/RANGE/PCT            3.6/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM           67.5/ 3/ 203.
   NOX  BCKGRD METER/RANGE/PPM             .2/ 3/   1.
   DILUTION FACTOR                           8.70
   HC   CONCENTRATION PPM                    16.
   CO   CONCENTRATION PPM                    15.
   CO2  CONCENTRATION PCT                    1.47
   NOX  CONCENTRATION PPM                   202.0
   HC   MASS GRAMS                           1.03
   CO   MASS GRAMS                           1.95
   CO2  MASS GRAMS                         3112.4
   NOX  MASS GRAMS                          38.29
   RUN TIME                SECONDS          765.
        DFC, WET (DRY)                   .806 ( .870)
        SCF, WET (DRY)                  1.000 ( .977)
        VOL (SCM)                           115.4
        SAM BLR (SCM)                        0.00
        KM  (MEASURED)                      16.20

   TEST NUMBER,                            001FET
   BAROMETER,              MM HG            747.8
   HUMIDITY,               G/KG               5.7
   TEMPERATURE,            DEG C             25.6
    CARBON DIOXIDE,         G/KM            191.2
   FUEL CONSUMPTION,       L/100KM           8.18

   HYDROCARBONS,           G/KM               .07
   CARBON MONOXIDE,        G/KM               .12
   OXIDES OF NITROGEN,     G/KM              2.35
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TABLE D-25. TEST NO. 082 EMISSIONS RESULTS

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                                            FTP   VEHICLE EMISSIONS RESULTS
                                                  PROJECT 11 5830-007

TEST NO.   082FTP   RUN   1                       VEHICLE NO.08                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 MONTE CARLO                    DATE    3/25/81                  ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                        BAG CART NO. 1 / CVS NO.  2      GASOLINE  EM-470-F
TRANSMISSION A3                                   DYNO NO.     3                   ODOMETER ****** KM(67529. MILES)

BAROMETER 741.60 MM HG(29.20 IN HG)               DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  40. PCT                        ABS. HUMIDITY  8.4 GM/KG         NOX HUMIDITY CORRECTION FACTOR   .93
BAG RESULTS
   BAG NUMBER                                          1                 2                  3                  4
   DESCRIPTION                                  COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)                782.3 (30.8)      787.4 (31.0)      782.3 (30.8)       787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)              774.7 (30.5)      777.2 (30.6)      774.7 (30.5)       777.2 (30.6)
   BLOWER INLET TEMP. DEG. C(DEG. F)             42.8 (109.0)      42.2 (108.0)      43.3 (110.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                             40566.            69544.            40490.             69522.
   TOT FLOW STD. CU. METRES(SCF)                 76.0 ( 2683.)    130.3 ( 4602.)     75.8 ( 2676.)     130.0 ( 4591.)
   HC   SAMPLE METER/RANGE/PPM                  11.2/ 3/ 112.     16.9/ 2/  17.     50.2/ 2/  50.      17.2/ 2/  17.
   HC   BCKGRD METER/RANGE/PPM                   1.2/ 3/  12.     11.1/ 2/  11.     11.8/ 2/  12.      12.2/ 2/  12.
   CO   SAMPLE METER/RANGE/PPM                  35.9/ 3/ 849.      8.2/13/   7.     57.6/12/ 125.       8.0/13/   7.
   CO   BCKGRD METER/RANGE/PPM                    .1/ 3/   2.       .7/13/   1.       .1/12/   0.        .1/13/   0.
   CO2  SAMPLE METER/RANGE/PCT                  71.8/ 3/ 1.30     49.9/ 3/  .87     64.6/ 3/ 1.15      40.4/ 3/  .84
   CO2  BCKGRD METER/RANGE/PCT                   2.8/ 3/  .04      3.2/ 3/  .05      3.1/ 3/  .05       3.2/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM                  40.6/ 3/ 122.     46.0/ 2/  47.     38.2/ 3/ 115.      44.1/ 2/  44.
   NOX  BCKGRD METER/RANGE/PPM                    .3/ 3/   1.       .7/ 2/   1.       .1/ 3/   0.        .6/ 2/   1.
   DILUTION FACTOR                                 9.61             15.44              11.43              15.78
   HC   CONCENTRATION PPM                         101.                7.                39.                 6.
   CO   CONCENTRATION PPM                         815.                7.               121.                 7.
   CO2  CONCENTRATION PCT                          1.26               .82               1.11                .79
   NOX  CONCENTRATION PPM                         121.0              46.1              114.3               43.5
   HC   MASS GRAMS                                 4.44               .49               1.72                .43
   CO   MASS GRAMS                                72.07              1.00              10.64               1.05
   CO2  MASS GRAMS                              1756.3            1953.0             1342.2             1881.6
   NOX  MASS GRAMS                                16.32             10.68              15.30              10.05

   HC   GRAMS/KM                                   .76               .08                .29                .07
   CO   GRAMS/KM                                 12.35               .16               1.82                .17
   CO2  GRAMS/KM                                 301.0             310.6              263.5              297.9
   NOX  GRAMS/KM                                  2.80              1.70               2.63               1.59
   FUEL CONSUMPTION BY CB L/100KM                13.78             13.20              11.41              12.74

   RUN TIME              SECONDS                  505.              867.               505.               868.
   MEASURED DISTANCE     KM                       5.84              6.29               5.05               6.32
   SCF, DRY                                       .975              .979               .976               .979
        DFC, WET (DRY)                                 .921 ( .909)                         .920 ( .916)
        SCF, WET (DRY)                                1.000 ( .970)                        1.000 ( .978)
        VOL (SCM)                                           206.3                                205.8
        SAM BLR (SCM)                                        0.00                                 0.00
        KM  (MEASURED)                                      12.13                                12.17
        FUEL CONSUMPTION L/100KM                            13.52                                12.10

COMPOSITE RESULTS                                                                                3-BAG       (4 BAG)
   TEST NUMBER            082FTP                        CARBON DIOXIDE        G/KM              295.7       ( 292.0)
   BAROMETER     MM HG   741.7                          FUEL CONSUMPTION      L/100KM           12.07       ( 12.71)
   HUMIDITY      G/KG      8.4                          HYDROCARBONS (THC)    G/KM                .20       (   .20)
   TEMPERATURE   DEG C    25.6                          CARBON MONOXIDE       G/KM               3.14       (  3.14)
                                                        OXIDES OF NITROGEN    G/KM               2.13       (  2.15)
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                                            HFET   VEHICLE EMISSIONS RESULTS
                                                   PROJECT 11 5830-007

TEST NO.   082FET   RUN   1                       VEHICLE NO.08                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 MONTE CARLO                    DATE    3/25/81                  ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                        BAG CART NO.  1                  GASOLINE  EM-470-F
TRANSMISSION A3                                   DYNO NO.      3                  ODOMETER ****** KM(67544. MILES)
                                                  CVS NO.   2

BAROMETER 743.71 MM HG(29.28 IN HG)               DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  41. PCT                        ABS. HUMIDITY  9.2 GM/KG         NOX HUMIDITY CORRECTION FACTOR   .95
0 BAG RESULTS
   TEST CYCLE                                        HFET

   BLOWER DIF P MM. H2O(IN. H2O)                800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)              787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)             43.3 (110.0)
   BLOWER REVOLUTIONS                             61373.
   TOT FLOW STD. CU. METRES(SCF)                114.9 ( 4057.)
   HC   SAMPLE METER/RANGE/PPM                  27.6/ 2/  28.
   HC   BCKGRD METER/RANGE/PPM                  13.1/ 2/  13.
   CO   SAMPLE METER/RANGE/PPM                  28.1/13/  26.
   CO   BCKGRD METER/RANGE/PPM                    .1/13/   0.
   CO2  SAMPLE METER/RANGE/PCT                  84.5/ 3/ 1.56
   CO2  BCKGRD METER/RANGE/PCT                   2.8/ 3/  .04
   NOX  SAMPLE METER/RANGE/PPM                  73.3/ 3/ 220.
   NOX  BCKGRD METER/RANGE/PPM                    .1/ 3/   0.
   DILUTION FACTOR                                 8.54
   HC   CONCENTRATION PPM                          16.
   CO   CONCENTRATION PPM                          25.
   CO2  CONCENTRATION PCT                          1.53
   NOX  CONCENTRATION PPM                         219.6
   HC   MASS GRAMS                                 1.06
   CO   MASS GRAMS                                 3.29
   CO2  MASS GRAMS                              3210.3
   NOX  MASS GRAMS                                46.02
   RUN TIME              SECONDS                  765.
        DFC, WET (DRY)                          .083 ( .071)
        SCF, WET (DRY)                         1.000 ( .972)
        VOL (SCM)                                114.9
        SAM BLR (SCM)                             0.00
        KM  (MEASURED)                           16.53

   TEST NUMBER,                                 082FET
   BAROMETER,            MM HG                   743.7
   HUMIDITY,             G/KG                      9.2
   TEMPERATURE,          DEG C                    26.7
    CARBON DIOXIDE,       G/KM                   194.2
   FUEL CONSUMPTION,     L/100KM                  8.31

   HYDROCARBONS,         G/KM                      .06
   CARBON MONOXIDE,      G/KM                      .20
   OXIDES OF NITROGEN,   G/KM                     2.78
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TABLE D -26. TEST NO. 086 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                             PROJECT 11-5030-007

TEST NO.   086FTP   RUN   1                VEHICLE NO.08                      TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 MONTE CARLO             DATE     3/26/81                   ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                 BAG CART NO. 1 / CVS NO.  2        GASOLINE  EM-470-F
TRANSMISSION A3                            DYNO NO.     3                     ODOMETER ****** KM(67373. MILES)

BAROMETER 745.24 MM HG(29.34 IN HG)        DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  52. PCT                 ABS. HUMIDITY 10.6 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.00
BAG RESULTS
  BAG NUMBER                                    1                   2                  3                  4
  DESCRIPTION                            COLD TRANSIENT        STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          787.4 (31.0)        787.4 (31.0)        782.3 (30.8)        787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)        782.3 (30.8)        782.3 (30.8)        772.2 (30.4)        782.3 (30.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.1 (109.5)        41.7 (107.0)        43.9 (111.0)        43.3 (110.0)
  BLOWER REVOLUTIONS                        40747.              67530.              40477.              69490.
  TOT FLOW STD. CU. METRES(SCF)           76.6 ( 2705.)      131.1 ( 4620.)       76.1 ( 2687.)      130.6 ( 4611.)
  HC   SAMPLE METER/RANGE/PPM            16.5/ 3/ 165.       31.4/ 2/  31.       76.1/ 2/  76.       30.2/ 2/  30.
  HC   BCKGRD METER/RANGE/PPM             1.5/ 3/  15.       13.0/ 2/  13.       13.7/ 2/  14.       16.2/ 2/  16.
  CO   SAMPLE METER/RANGE/PPM            62.0/ 3/1571.       82.1/12/ 196.       91.7/11/ 456.       71.6/12/ 164.
  CO   BCKGRD METER/RANGE/PPM              .1/ 3/   2.         .9/12/   2.         .3/11/   1.         .4/12/   1.
  CO2  SAMPLE METER/RANGE/PCT            66.0/ 3/ 1.20       46.9/ 3/  .81       61.0/ 3/ 1.08       45.8/ 3/  .79
  CO2  BCKGRD METER/RANGE/PCT             3.2/ 3/  .05        2.6/ 3/  .04        2.8/ 3/  .04        3.3/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM            44.9/ 2/  45.       11.3/ 2/  11.       36.6/ 2/  37.       10.5/ 2/  11.
  NOX  BCKGRD METER/RANGE/PPM              .9/ 2/   1.         .6/ 2/   1.         .6/ 2/   1.         .9/ 2/   1.
  DILUTION FACTOR                            9.81                16.15               11.81               16.63
  HC   CONCENTRATION PPM                    152.                 19.                 64.                 15.
  CO   CONCENTRATION PPM                   1506.                108.                438.                150.
  CO2  CONCENTRATION PCT                    1.16                 .77                1.04                 .74
  NOX  CONCENTRATION PPM                    44.1                10.7                36.1                 9.7
  HC   MASS GRAMS                            6.69                1.45                2.79                1.13
  CO   MASS GRAMS                          134.32               28.64               38.77               24.00
  CO2  MASS GRAMS                          1620.4              1840.6              1453.0              1767.4
  NOX  MASS GRAMS                            6.44                2.68                5.23                2.40

  HC   GRAMS/KM                              1.15                 .23                 .48                 .18
  CO   GRAMS/KM                             23.03                4.61                6.63                3.83
  CO2  GRAMS/KM                             277.8               297.8               248.3               282.3
  NOX  GRAMS/KM                              1.10                 .43                 .89                 .38
  FUEL CONSUMPTION BY CB L/100KM            13.56               13.05               11.11               12.33

  RUN TIME              SECONDS             505.                867.                505.                868.
  MEASURED DISTANCE     KM                  5.83                6.21                5.85                6.26
  SCF, DRY                                  .972                .976                .973                .976
       DFC, WET (DRY)                              .923 ( .908)                            .931 ( .915)
       SCF, WET (DRY)                             1.000 ( .974)                           1.000 ( .975)
       VOL (SCM)                                        207.7                                   206.7
       SAM BLR (SCM)                                     0.00                                    0.00
       KM  (MEASURED)                                   12.04                                   12.12
       FUEL CONSUMPTION L/100KM                         13.30                                   11.74

COMPOSITE RESULTS
   TEST NUMBER              086FTP                                                           3-BAG        (4-BAG)
   BAROMETER      MM HG     745.2                       CARBON DIOXIDE        G/KM           280.0       ( 275.4)
   HUMIDITY       G/KG       10.6                       FUEL CONSUMPTION      L/100KM        12.62       ( 12.41)
   TEMPERATURE    DEG C      25.0                       HYDROCARBONS (THC)    G/KM             .49       (   .48)
                                                        CARBON MONOXIDE       G/KM            9.01       (  8.77)
                                                        OXIDES OF NITROGEN    G/KM             .70       (   .68)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5030-007

TEST NO.   086FET   RUN   1                VEHICLE NO.08                      TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   78 MONTE CARLO             DATE     3/26/81                   ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                 BAG CART NO.  1                    GASOLINE  EM-470-F
TRANSMISSION A3                            DYNO NO.      3                    ODOMETER ****** KM(67500. MILES)
                                           CVS NO.    2

BAROMETER 745.24 MM HG(29.34 IN HG)        DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  51. PCT                 ABS. HUMIDITY 11.4 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.02
0 BAG RESULTS
   TEST CYCLE                                 HFET

   BLOWER DIF P MM. H2O(IN. H2O)          800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)        787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)       43.9 (111.0)
   BLOWER REVOLUTIONS                        61279.
   TOT FLOW STD. CU. METRES(SCF)          114.9 ( 4058.)
   HC   SAMPLE METER/RANGE/PPM            47.2/ 2/  47.
   HC   BCKGRD METER/RANGE/PPM            12.3/ 2/  12.
   CO   SAMPLE METER/RANGE/PPM            77.7/12/ 182.
   CO   BCKGRD METER/RANGE/PPM              .1/12/   0.
   CO2  SAMPLE METER/RANGE/PCT            85.9/ 3/ 1.59
   CO2  BCKGRD METER/RANGE/PCT             3.2/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM            58.8/ 2/  59.
   NOX  BCKGRD METER/RANGE/PPM              .9/ 2/   1.
   DILUTION FACTOR                            8.30
   HC   CONCENTRATION PPM                     36.
   CO   CONCENTRATION PPM                    173.
   CO2  CONCENTRATION PCT                    1.55
   NOX  CONCENTRATION PPM                    58.0
   HC   MASS GRAMS                            2.41
   CO   MASS GRAMS                           23.10
   CO2  MASS GRAMS                          3259.7
   NOX  MASS GRAMS                           13.03
   RUN TIME              SECONDS             765.
        DFC, WET (DRY)                   .880 ( .865)
        SCF, WET (DRY)                  1.000 ( .969)
        VOL (SCM)                            114.9
        SAM BLR (SCM)                         0.00
        KM  (MEASURED)                       16.52

   TEST NUMBER,                              086FET
   BAROMETER,             MM HG               745.2
   HUMIDITY,              G/KG                 11.4
   TEMPERATURE,           DEG C                26.7
    CARBON DIOXIDE,        G/KM               197.4
   FUEL CONSUMPTION,      L/100KM              8.54

   HYDROCARBONS,          G/KM                  .15
   CARBON MONOXIDE,       G/KM                 1.40
   OXIDES OF NITROGEN,    G/KM                  .79
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TABLE D-27. TEST NO. 087 EMISSIONS RESULTS

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                                  FTP    VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5030-007

TEST NO.   087FTP   RUN   1                 VEHICLE NO.00                        TEST WEIGHT  1500. KG( 3500. LBS)
VEHICLE MODEL   78 MONTE CARLO              DATE    3/27/81                      ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                  BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                      ODOMETER ****** KM(67611. MILES)

BAROMETER 740.16 MM HG(29.14 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  60. PCT                  ABS. HUMIDITY 12.2 GM/KG             NOX HUMIDITY CORRECTION FACTOR  1.05
BAG RESULTS
   BAG NUMBER                                    1                  2                  3                  4
   DESCRIPTION                            COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)           702.3 (30.0)       707.4 (31.0)       702.3 (30.0)       707.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)         774.7 (30.5)       702.3 (30.0)       774.7 (30.5)       777.2 (30.6)
   BLOWER INLET TEMP. DEG. C(DEG. F)        43.1 (109.5)       41.7 (107.0)       42.0 (109.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                         40536.             69560.             40507.             67473.
   TOT FLOW STD. CU. METRES(SCF)           75.7 ( 2674.)      130.1 ( 4594.)      75.7 ( 2673.)      129.6 ( 4577.)
   HC   SAMPLE METER/RANGE/PPM             19.0/ 3/ 190.      30.1/ 2/  30.      80.3/ 2/  80.      27.2/ 2/  27.
   HC   BCKGRD METER/RANGE/PPM              1.2/ 3/  12.      10.5/ 2/  11.      10.5/ 2/  11.      10.2/ 2/  10.
   CO   SAMPLE METER/RANGE/PPM             66.2/ 3/1700.      82.3/12/ 196.      87.5/11/ 421.      70.6/12/ 161.
   CO   BCKGRD METER/RANGE/PPM               .1/ 3/   2.        .5/12/   1.        .1/11/   0.        .1/12/   0.
   CO2  SAMPLE METER/RANGE/PCT             67.0/ 3/ 1.20      46.6/ 3/  .80      61.9/ 3/ 1.10      45.9/ 3/  .79
   CO2  BCKGRD METER/RANGE/PCT              2.9/ 3/  .04       2.5/ 3/  .04       3.2/ 3/  .05       3.3/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM             44.8/ 2/  45.      11.3/ 2/  11.      35.3/ 2/  35.      10.0/ 2/  10.
   NOX  BCKGRD METER/RANGE/PPM               .8/ 2/   1.        .7/ 2/   1.        .5/ 2/   1.        .5/ 2/   1.
   DILUTION FACTOR                              9.47               16.26              11.66              16.61
   HC   CONCENTRATION PPM                      179.                20.                71.                18.
   CO   CONCENTRATION PPM                     1626.               109.               403.               155.
   CO2  CONCENTRATION PCT                      1.16                .77               1.06                .74
   NOX  CONCENTRATION PPM                      44.1               10.4               34.8                9.5
   HC   MASS GRAMS                             7.03               1.52               3.09               1.32
   CO   MASS GRAMS                           143.36              20.57              35.54              23.43
   CO2  MASS GRAMS                           1612.9             1025.0             1463.5             1759.0
   NOX  MASS GRAMS                             6.71               2.78               5.30               2.43

   HC   GRAMS/KM                               1.35                .24                .53                .21
   CO   GRAMS/KM                              24.46               4.59               6.11               3.76
   CO2  GRAMS/KM                              277.5              293.3              251.5              282.6
   NOX  GRAMS/KM                               1.15                .45                .91                .40
   FUEL CONSUMPTION BY CB L/100KM             13.60              12.06              11.22              12.34

   RUN TIME              SECONDS               505.               867.               505.               867.
   MEASURED DISTANCE     KM                    5.81               6.22               5.82               6.22
   SCF, DRY                                    .970               .973               .971               .973
       DFC, WET (DRY)                                .923 ( .905)                          .930 ( .912)
       SCF, WET (DRY)                               1.000 ( .972)                         1.000 ( .972)
       VOL (SCM)                                            205.8                                  205.3
       SAM BLR (SCM)                                         0.00                                   0.00
       KM  (MEASURED)                                       12.04                                  12.04
       FUEL CONSUMPTION L/100KM                             13.25                                  11.80

COMPOSITE RESULTS
   TEST NUMBER           087FTP                                                            3 BAG       (4-BAG)
   BAROMETER     MM HG    740.2                   CARBON DIOXIDE        G/KM               270.5     ( 275.3)
   HUMIDITY      G/KG      12.2                   FUEL CONSUMPTION      L/100KM            12.50     ( 12.42)
   TEMPERATURE   DEG C     25.0                   HYDROCARBONS (THC)    G/KM                 .55     (   .54)
                                                  CARBON MONOXIDE       G/KM                9.18     (  8.93)
                                                  OXIDES OF NITROGEN    G/KM                 .72     (   .71)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5030-007

TEST NO.   087FET   RUN   1                 VEHICLE NO.00                        TEST WEIGHT  1500. KG( 3500. LBS)
VEHICLE MODEL   78 MONTE CARLO              DATE    3/27/81                      ACTUAL ROAD LOAD   8.0 KW( 10.7 HP)
ENGINE 3.8 L(231. CID) V-6                  BAG CART NO.  1                      GASOLINE  EM-470-F
TRANSMISSION A3                             DYNO NO.      3                      ODOMETER ****** KM(67626. MILES)
                                            CVS NO.   2

BAROMETER 739.90 MM HG(29.13 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  60. PCT                  ABS. HUMIDITY 12.2 GM/KG             NOX HUMIDITY CORRECTION FACTOR  1.05
0 BAG RESULTS
   TEST CYCLE                                  HFET

   BLOWER DIF P MM. H2O(IN. H2O)            707.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)          702.3 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)
   BLOWER REVOLUTIONS                          61277.
   TOT FLOW STD. CU. METRES(SCF)            114.2 ( 4034.)
   HC   SAMPLE METER/RANGE/PPM               38.9/ 2/  39.
   HC   BCKGRD METER/RANGE/PPM                9.6/ 2/  10.
   CO   SAMPLE METER/RANGE/PPM               74.0/12/ 171.
   CO   BCKGRD METER/RANGE/PPM                 .2/12/   0.
   CO2  SAMPLE METER/RANGE/PCT               84.0/ 3/ 1.59
   CO2  BCKGRD METER/RANGE/PCT                2.6/ 3/  .04
   NOX  SAMPLE METER/RANGE/PPM               56.6/ 2/  57.
   NOX  BCKGRD METER/RANGE/PPM                 .9/ 2/   1.
   DILUTION FACTOR                                8.30
   HC   CONCENTRATION PPM                         30.
   CO   CONCENTRATION PPM                        162.
   CO2  CONCENTRATION PCT                        1.56
   NOX  CONCENTRATION PPM                        55.0
   HC   MASS GRAMS                               2.01
   CO   MASS GRAMS                              21.55
   CO2  MASS GRAMS                             3261.7
   NOX  MASS GRAMS                              12.02
   RUN TIME                  SECONDS             765.
       DFC, WET (DRY)                        .880 ( .863)
       SCF, WET (DRY)                       1.000 ( .966)
       VOL (SCM)                                 114.2
       SAM BLR (SCM)                              0.00
       KM  (MEASURED)                            16.46

   TEST NUMBER,                                087FET
   BAROMETER,               MM HG               739.9
   HUMIDITY,                G/KG                 12.2
   TEMPERATURE,             DEG C                25.0
    CARBON DIOXIDE,          G/KM               198.1
   FUEL CONSUMPTION,        L/100KM              8.36

   HYDROCARBONS,            G/KM                  .12
   CARBON MONOXIDE,         G/KM                 1.31
   OXIDES OF NITROGEN,      G/KM                  .78
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TABLE D-28. TEST NO. 091 EMISSIONS RESULTS

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                                FTP    VEHICLE EMISSIONS RESULTS
                                        PROJECT 11-5830-010

TEST NO.   091FTP   RUN   1              VEHICLE NO.09                     TEST WEIGHT   907. KG( 2000. LBS)
VEHICLE MODEL   78 FORD FIESTA           DATE     3/31/81                  ACTUAL ROAD LOAD   4.0 KW(  5.4 HP)
ENGINE 1.6 L( 98. CID) L-4               BAG CART NO. 1 / CVS NO.  2       GASOLINE  EM-470-F
TRANSMISSION A3                          DYNO NO.      3                   ODOMETER ****** KM(67981. MILES)

BAROMETER 738.12 MM HG(29.06 IN HG)      DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  66. PCT               ABS. HUMIDITY 12.7 GM/KG          NOX HUMIDITY CORRECTION FACTOR  1.07
BAG RESULTS
  BAG NUMBER                                    1                  2                  3                  4
  DESCRIPTION                            COLD TRANSIENT       STABILIZED        HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          774.7 (30.5)       800.1 (31.5)       800.1 (31.5)       787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)        767.1 (30.2)       787.4 (31.0)       787.4 (31.0)       764.5 (30.1)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.9 (111.0)       38.9 (102.0)       41.1 (106.0)       37.8 (100.0)
  BLOWER REVOLUTIONS                        40551.             68563.             40507.             69481.
  TOT FLOW STD. CU. METRES(SCF)          75.5 ( 2666.)      128.3 ( 4531.)      75.5 ( 2667.)     130.8 ( 4619.)
  HC   SAMPLE METER/RANGE/PPM             9.9/ 3/  99.      32.7/ 2/  33.      69.6/ 2/  70.      31.0/ 2/  31.
  HC   BCKGRD METER/RANGE/PPM             1.3/ 3/  13.      12.2/ 2/  12.      13.3/ 2/  13.      14.2/ 2/  14.
  CO   SAMPLE METER/RANGE/PPM            82.9/11/ 384.      17.2/13/  16.      64.2/13/  62.      17.7/13/  16.
  CO   BCKGRD METER/RANGE/PPM              .3/11/   1.       1.0/13/   1.       1.3/13/   1.       1.3/13/   1.
  CO2  SAMPLE METER/RANGE/PCT            47.2/ 3/  .81      32.8/ 3/  .55      40.9/ 3/  .69      32.6/ 3/  .54
  CO2  BCKGRD METER/RANGE/PCT             3.0/ 3/  .05       3.1/ 3/  .05       3.0/ 3/  .05       3.3/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM            88.4/ 2/  88.      37.3/ 2/  37.      86.9/ 2/  87.      36.8/ 2/  37.
  NOX  BCKGRD METER/RANGE/PPM              .8/ 2/   1.        .8/ 2/   1.        .7/ 2/   1.       1.1/ 2/   1.
  DILUTION FACTOR                          15.50              24.34              18.94              24.50
  HC   CONCENTRATION PPM                    87.                21.                57.                17.
  CO   CONCENTRATION PPM                   369.                14.                59.                14.
  CO2  CONCENTRATION PCT                    .77                .50                .65                .49
  NOX  CONCENTRATION PPM                   87.7               36.5               86.2               35.7
  HC   MASS GRAMS                          3.78               1.55               2.48               1.31
  CO   MASS GRAMS                         32.43               2.13               5.16               2.20
  CO2  MASS GRAMS                        1064.8             1175.5              900.4             1182.4
  NOX  MASS GRAMS                         13.55               9.60              13.34               9.57

  HC   GRAMS/KM                             .65                .25                .43                .21
  CO   GRAMS/KM                            5.57                .34                .90                .35
  CO2  GRAMS/KM                           182.8              186.5              156.7              190.3
  NOX  GRAMS/KM                            2.33               1.52               2.32               1.54
  FUEL CONSUMPTION BY CB L/100KM           8.26               8.02               6.81               8.19

  RUN TIME              SECONDS            505.               868.               505.               867.
  MEASURED DISTANCE     KM                 5.83               6.30               5.74               6.21
  SCF, DRY                                 .971               .974               .972               .974
       DFC, WET (DRY)                              .950 ( .930)                          .955 ( .934)
       SCF, WET (DRY)                             1.000 ( .973)                         1.000 ( .973)
       VOL (SCM)                                        203.8                                 206.3
       SAM BLR (SCM)                                     0.00                                  0.00
       KM  (MEASURED)                                   12.13                                 11.96
       FUEL CONSUMPTION L/100KM                          8.14                                  7.52

COMPOSITE RESULTS                                                                            3-BAG      (4-BAG)
    TEST NUMBER           091FTP                          CARBON DIOXIDE       G/KM          177.7     ( 178.7)
    BAROMETER     MM HG   738.1                           FUEL CONSUMPTION     L/100KM        7.74     (  7.70)
    HUMIDITY      G/KG     12.7                           HYDROCARBONS (THC)   G/KM            .38     (   .37)
    TEMPERATURE   DEG C    23.9                           CARBON MONOXIDE      G/KM           1.57     (  1.58)
                                                          OXIDES OF NITROGEN   G/KM           1.91     (  1.91)
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                               HFET   VEHICLE EMISSIONS RESULTS
                                       PROJECT 11-5830-010

 TEST NO.   091FET   RUN   1              VEHICLE NO.09                     TEST WEIGHT   907. KG( 2000. LBS)
 VEHICLE MODEL   78 FORD FIESTA           DATE     3/31/81                  ACTUAL ROAD LOAD   4.0 KW(  5.4 HP)
 ENGINE 1.6 L( 98. CID) L-4               BAG CART NO.   1                  GASOLINE  EM-470-F
 TRANSMISSION A3                          DYNO NO.       3                  ODOMETER ****** KM(67996. MILES)
                                          CVS NO.   2

 BAROMETER 739.14 MM HG(29.10 IN HG)      DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
 RELATIVE HUMIDITY  60. PCT               ABS. HUMIDITY 12.2 GM/KG          NOX HUMIDITY CORRECTION FACTOR  1.05
0 BAG RESULTS
   TEST CYCLE                                HFET

   BLOWER DIF P MM. H2O(IN. H2O)          800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)        787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)       41.7 (107.0)
   BLOWER REVOLUTIONS                        61290.
   TOT FLOW STD. CU. METRES(SCF)          114.4 ( 4038.)
   HC   SAMPLE METER/RANGE/PPM             46.9/ 2/  47.
   HC   BCKGRD METER/RANGE/PPM             13.7/ 2/  14.
   CO   SAMPLE METER/RANGE/PPM             14.2/13/  13.
   CO   BCKGRD METER/RANGE/PPM              1.0/13/   1.
   CO2  SAMPLE METER/RANGE/PCT             55.8/ 3/  .98
   CO2  BCKGRD METER/RANGE/PCT              3.0/ 3/  .05
   NOX  SAMPLE METER/RANGE/PPM             49.2/ 3/ 148.
   NOX  BCKGRD METER/RANGE/PPM               .4/ 3/   1.
   DILUTION FACTOR                          13.59
   HC   CONCENTRATION PPM                    34.
   CO   CONCENTRATION PPM                    12.
   CO2  CONCENTRATION PCT                    .94
   NOX  CONCENTRATION PPM                   146.5
   HC   MASS GRAMS                           2.26
   CO   MASS GRAMS                           1.54
   CO2  MASS GRAMS                         1962.9
   NOX  MASS GRAMS                          33.70
   RUN TIME                 SECONDS          765.
        DFC, WET (DRY)                    .926 ( .909)
        SCF, WET (DRY)                   1.000 ( .972)
        VOL (SCM)                           114.4
        SAM BLR (SCM)                        0.00
        KM  (MEASURED)                      16.38

   TEST NUMBER.                             091FET
   BAROMETER.               MM HG            739.1
   HUMIDITY.                G/KG              12.2
   TEMPERATURE.             DEG C             25.0
    CARBON DIOXIDE.          G/KM            119.9
   FUEL CONSUMPTION.        L/100KM           5.14

   HYDROCARBONS.            G/KM               .14
   CARBON MONOXIDE.         G/KM               .09
   OXIDES OF NITROGEN.      G/KM              2.06
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TABLE D-29. TEST NO. 092 EMISSIONS RESULTS

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                                FTP   VEHICLE EMISSIONS RESULTS
                                        PROJECT 11-5830-010

TEST NO.   092FTP    RUN   1           VEHICLE NO.09                           TEST WEIGHT    907. KG( 2000. LBS)
VEHICLE MODEL    78 FORD FIESTA        DATE     4/ 1/81                        ACTUAL ROAD LOAD   4.0 KW(   5.4 HP)
ENGINE 1.6 L( 98. CID) L-4             BAG CART NO. 1 / CVS NO.  2             GASOLINE  EM-470
TRANSMISSION M4                        DYNO NO.        3                       ODOMETER ****** KM(68007. MILES)

BAROMETER 745.49 MM HG(29.35 IN HG)    DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  49. PCT             ABS. HUMIDITY  9.9 GM/KG                NOX HUMIDITY CORRECTION FACTOR   .97
BAG RESULTS
  BAG NUMBER                                   1                  2                  3                  4
  DESCRIPTION                           COLD TRANSIENT       STABILIZED        HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          792.5 (31.2)       792.5 (31.2)       787.4 (31.0)       792.5 (31.2)
  BLOWER INLET P MM. H2O(IN. H2O)        787.4 (31.0)       787.4 (31.0)       782.3 (30.8)       787.4 (31.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)       42.8 (109.0)       43.1 (109.5)       42.8 (109.0)
  BLOWER REVOLUTIONS                       40563.             69393.             40502.             69502.
  TOT FLOW STD. CU. METRES(SCF)          76.2 ( 2691.)     130.5 ( 4607.)      76.2 ( 2690.)     130.7 ( 4614.)
  HC  SAMPLE METER/RANGE/PPM             11.0/ 3/ 110.      31.9/ 2/  32.      81.8/ 2/  82.      28.9/ 2/  29.
  HC  BCKGRD METER/RANGE/PPM              1.5/ 3/  15.      14.4/ 2/  14.      13.3/ 2/  13.      12.6/ 2/  13.
  CO  SAMPLE METER/RANGE/PPM             82.5/11/ 381.      21.6/13/  20.      63.8/13/  61.      22.5/13/  21.
  CO  BCKGRD METER/RANGE/PPM              1.4/11/   4.       3.2/13/   3.       1.2/13/   1.       1.0/13/   1.
  CO2 SAMPLE METER/RANGE/PCT             44.6/ 3/  .76      32.6/ 3/  .54      39.7/ 3/  .67      31.9/ 3/  .53
  CO2 BCKGRD METER/RANGE/PCT              3.4/ 3/  .05       3.0/ 3/  .05       3.1/ 3/  .05       2.9/ 3/  .04
  NOX SAMPLE METER/RANGE/PPM             88.2/ 2/  88.      38.7/ 2/  39.      89.4/ 2/  89.      37.7/ 2/  38.
  NOX BCKGRD METER/RANGE/PPM              1.2/ 2/   1.       1.1/ 2/   1.       1.0/ 2/   1.       1.0/ 2/   1.
  DILUTION FACTOR                          14.50              24.48              19.52              25.07
  HC  CONCENTRATION PPM                    96.                10.                69.                17.
  CO  CONCENTRATION PPM                   366.                16.                59.                19.
  CO2 CONCENTRATION PCT                    .72                .50                .63                .49
  NOX CONCENTRATION PPM                   87.1               37.6               88.5               36.7
  HC  MASS GRAMS                          4.21               1.36               3.04               1.27
  CO  MASS GRAMS                         32.43               2.50               5.21               2.91
  CO2 MASS GRAMS                         997.6             1190.2              874.6             1165.3
  NOX MASS GRAMS                         12.36               9.15              12.55               8.95

  HC  GRAMS/KM                             .73                .22                .53                .21
  CO  GRAMS/KM                            5.63                .40                .90                .47
  CO2 GRAMS/KM                           173.3              191.9              151.8              188.8
  NOX GRAMS/KM                            2.15               1.48               2.18               1.45
  FUEL CONSUMPTION BY CB L/100KM          7.87               8.25               6.61               8.12

  RUN TIME               SECONDS          505.               865.               505.               868.
  MEASURED DISTANCE      KM               5.76               6.20               5.76               6.17
  SCF, DRY                                .977               .979               .978               .979
         DFC, WET (DRY)                         .952 ( .937)                          .956 ( .941)
         SCF, WET (DRY)                        1.000 ( .978)                         1.000 ( .979)
         VOL (SCM)                                    206.7                                 206.9
         SAM BLR (SCM)                                 0.00                                  0.00
         KM  (MEASURED)                               11.96                                 11.93
         FUEL CONSUMPTION L/100KM                      8.07                                  7.39
COMPOSITE RESULTS                                                                            3-BAG      (4-BAG)
  TEST NUMBER          092FTP                               CARBON DIOXIDE       G/KM        177.0      ( 176.1)
  BAROMETER    MM HG    745.5                               FUEL CONSUMPTION     L/100KM      7.72      (   7.68)
  HUMIDITY     G/KG       9.9                               HYDROCARBONS (THC)   G/KM          .41      (    .41)
  TEMPERATURE  DEG C     25.0                               CARBON MONOXIDE      G/KM         1.62      (   1.64)
                                                            OXIDES OF NITROGEN   G/KM         1.81      (   1.80)


                                HFET   VEHICLE EMISSIONS RESULTS
                                        PROJECT 11-5830-010

TEST NO.   092FET    RUN   1           VEHICLE NO.09                           TEST WEIGHT    907. KG( 2000. LBS)
VEHICLE MODEL    78 FORD FIESTA        DATE     4/ 1/81                        ACTUAL ROAD LOAD   4.0 KW(   5.4 HP)
ENGINE 1.6 L( 98. CID) L-4             BAG CART NO.  1                         GASOLINE  EM-470
TRANSMISSION M4                        DYNO NO.      3                         ODOMETER ****** KM(68023. MILES)
                                       CVS NO.   2

BAROMETER 745.49 MM HG(29.35 IN HG)    DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  52. PCT             ABS. HUMIDITY 10.2 GM/KG                NOX HUMIDITY CORRECTION FACTOR   .98
0 BAG RESULTS
  TEST CYCLE                               HFET

  BLOWER DIF P MM. H2O(IN. H2O)          792.5 (31.2)
  BLOWER INLET P MM. H2O(IN. H2O)        787.4 (31.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)
  BLOWER REVOLUTIONS                       61227.
  TOT FLOW STD. CU. METRES(SCF)         115.0 ( 4061.)
  HC  SAMPLE METER/RANGE/PPM             44.6/ 2/  45.
  HC  BCKGRD METER/RANGE/PPM             10.6/ 2/  11.
  CO  SAMPLE METER/RANGE/PPM             17.1/13/  16.
  CO  BCKGRD METER/RANGE/PPM               .9/13/   1.
  CO2 SAMPLE METER/RANGE/PCT             55.5/ 3/  .97
  CO2 BCKGRD METER/RANGE/PCT              3.1/ 3/  .05
  NOX SAMPLE METER/RANGE/PPM             53.0/ 3/ 159.
  NOX BCKGRD METER/RANGE/PPM               .3/ 3/   1.
  DILUTION FACTOR                          13.67
  HC  CONCENTRATION PPM                    35.
  CO  CONCENTRATION PPM                    14.
  CO2 CONCENTRATION PCT                    .93
  NOX CONCENTRATION PPM                   158.2
  HC  MASS GRAMS                          2.31
  CO  MASS GRAMS                          1.91
  CO2 MASS GRAMS                        1958.4
  NOX MASS GRAMS                         34.15
  RUN TIME               SECONDS          765.
       DFC, WET (DRY)                   .927 ( .911)
       SCF, WET (DRY)                  1.000 ( .974)
       VOL (SCM)                         115.0
       SAM BLR (SCM)                      0.00
       KM  (MEASURED)                    16.32

  TEST NUMBER,                           092FET
  BAROMETER,            MM HG             745.5
  HUMIDITY,             G/KG               10.2
  TEMPERATURE,          DEG C              24.4
   CARBON DIOXIDE,       G/KM             120.0
  FUEL CONSUMPTION,     L/100KM            5.15

  HYDROCARBONS,         G/KM                .14
  CARBON MONOXIDE,      G/KM                .12
  OXIDES OF NITROGEN,   G/KM               2.09
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TABLE D-30. TEST NO. 096 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5830-010

TEST NO.   096FTP   RUN   1             VEHICLE NO.09                          TEST WEIGHT   907. KG( 2000. LBS)
VEHICLE MODEL   78 FORD FIESTA          DATE    4/ 3/81                        ACTUAL ROAD LOAD   4.0 KW(  5.4 HP)
ENGINE 1.6 L( 98. CID) L-4              BAG CART NO. 1 / CVS NO.  2            GASOLINE  EM-470
TRANSMISSION                            DYNO NO.      3                        ODOMETER ****** KM(60055. MILES)

BAROMETER 734.06 MM HG(28.90 IN HG)     DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  70. PCT              ABS. HUMIDITY 13.6 GM/KG               NOX HUMIDITY CORRECTION FACTOR  1.10
BAG RESULTS
  BAG NUMBER                                  1                   2                  3                   4
  DESCRIPTION                           COLD TRANSIENT        STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          774.7 (30.5)        707.4 (31.0)       782.3 (30.8)        787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)        767.1 (30.2)        702.3 (30.8)       774.7 (30.5)        782.3 (30.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)       42.8 (109.0)        42.8 (109.0)       42.8 (109.0)        42.8 (109.0)
  BLOWER REVOLUTIONS                       40532.              69646.             40494.              69555.
  TOT FLOW STD. CU. METRES(SCF)          75.1 ( 2653.)      128.8 ( 4549.)      75.0 ( 2648.)      128.7 ( 4543.)
  HC   SAMPLE METER/RANGE/PPM             9.6/ 3/  96.       29.1/ 2/  29.      59.5/ 2/  60.       27.3/ 2/  27.
  HC   BCKGRD METER/RANGE/PPM             1.2/ 3/  12.       11.7/ 2/  12.      11.2/ 2/  11.       11.1/ 2/  11.
  CO   SAMPLE METER/RANGE/PPM            79.0/11/ 355.       11.6/13/  10.      50.9/13/  48.       10.2/13/   9.
  CO   BCKGRD METER/RANGE/PPM              .3/11/   1.         .7/13/   1.        .1/13/   0.         .1/13/   0.
  CO2  SAMPLE METER/RANGE/PCT            44.9/ 3/  .77       32.5/ 3/  .54      39.9/ 3/  .68       31.0/ 3/  .51
  CO2  BCKGRD METER/RANGE/PCT             2.4/ 3/  .04        2.8/ 3/  .04       3.2/ 3/  .05        2.4/ 3/  .04
  NOX  SAMPLE METER/RANGE/PPM            78.2/ 2/  78.       34.6/ 2/  35.      82.1/ 2/  82.       35.4/ 2/  35.
  NOX  BCKGRD METER/RANGE/PPM             1.2/ 2/   1.        1.2/ 2/   1.       1.2/ 2/   1.         .8/ 2/   1.
  DILUTION FACTOR                            16.47               24.62              19.52               25.91
  HC   CONCENTRATION PPM                     85.                 18.                49.                 17.
  CO   CONCENTRATION PPM                    341.                 10.                46.                  9.
  CO2  CONCENTRATION PCT                      .74                 .50                .63                 .48
  NOX  CONCENTRATION PPM                    77.1                33.4               81.0                34.6
  HC   MASS GRAMS                            3.67                1.33               2.11                1.23
  CO   MASS GRAMS                           29.83                1.43               4.04                1.32
  CO2  MASS GRAMS                         1011.5              1177.9              864.0              1126.6
  NOX  MASS GRAMS                           12.22                9.10              12.81                9.40

  HC   GRAMS/KM                               .63                 .21                .36                 .20
  CO   GRAMS/KM                              5.15                 .23                .70                 .21
  CO2  GRAMS/KM                             174.6               189.3              148.8               181.7
  NOX  GRAMS/KM                              2.11                1.46               2.21                1.52
  FUEL CONSUMPTION BY CB L/100KM             7.88                8.13               6.45                7.80

  RUN TIME                 SECONDS        505.                868.               505.                868.
  MEASURED DISTANCE        KM             5.79                6.22               5.81                6.20
  SCF, DRY                                .970                .972               .971                .973
       DFC, WET (DRY)                             .952 ( .930)                           .957 ( .935)
       SCF, WET (DRY)                            1.000 ( .972)                          1.000 ( .972)
       VOL (SCM)                                        204.0                                  203.6
       SAM BLR (SCM)                                     0.00                                   0.00
       KM  (MEASURED)                                   12.01                                  12.01
       FUEL CONSUMPTION L/100KM                          8.01                                   7.14

COMPOSITE RESULTS
  TEST NUMBER            096FTP                                                        3-BAG       (4-BAG)
  BAROMETER     MM HG    734.1             CARBON DIOXIDE         G/KM                 175.1      ( 172.9)
  HUMIDITY      G/KG      13.6             FUEL CONSUMPTION       L/100KM               7.61      (   7.52)
  TEMPERATURE   DEG C     23.9             HYDROCARBONS (THC)     G/KM                   .34      (    .34)
                                           CARBON MONOXIDE        G/KM                  1.38      (   1.37)
                                           OXIDES OF NITROGEN     G/KM                  1.80      (   1.82)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                           PROJECT 11-5830-010

TEST NO.   096FET   RUN   1             VEHICLE NO.09                          TEST WEIGHT   907. KG( 2000. LBS)
VEHICLE MODEL   78 FORD FIESTA          DATE    4/ 3/81                        ACTUAL ROAD LOAD   4.0 KW(  5.4 HP)
ENGINE 1.6 L( 98. CID) L-4              BAG CART NO.  1                        GASOLINE  EM-470
TRANSMISSION                            DYNO NO.      3                        ODOMETER ****** KM(60071. MILES)
                                        CVS NO.   2

BAROMETER 733.55 MM HG(28.88 IN HG)     DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  57. PCT              ABS. HUMIDITY 12.6 GM/KG               NOX HUMIDITY CORRECTION FACTOR  1.07
0 BAG RESULTS
   TEST CYCLE                              HFET

   BLOWER DIF P MM. H2O(IN. H2O)        792.5 (31.2)
   BLOWER INLET P MM. H2O(IN. H2O)      787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)     42.8 (109.0)
   BLOWER REVOLUTIONS                      61300.
   TOT FLOW STD. CU. METRES(SCF)        113.2 ( 3998.)
   HC   SAMPLE METER/RANGE/PPM          35.6/ 2/  36.
   HC   BCKGRD METER/RANGE/PPM          11.7/ 2/  12.
   CO   SAMPLE METER/RANGE/PPM          11.0/13/  10.
   CO   BCKGRD METER/RANGE/PPM            .1/13/   0.
   CO2  SAMPLE METER/RANGE/PCT          55.0/ 3/  .96
   CO2  BCKGRD METER/RANGE/PCT           2.5/ 3/  .04
   NOX  SAMPLE METER/RANGE/PPM          42.3/ 3/ 127.
   NOX  BCKGRD METER/RANGE/PPM            .3/ 3/   1.
   DILUTION FACTOR                         13.83
   HC   CONCENTRATION PPM                  25.
   CO   CONCENTRATION PPM                   9.
   CO2  CONCENTRATION PCT                   .93
   NOX  CONCENTRATION PPM                 126.1
   HC   MASS GRAMS                          1.62
   CO   MASS GRAMS                          1.25
   CO2  MASS GRAMS                       1925.3
   NOX  MASS GRAMS                         29.11
   RUN TIME                 SECONDS       765.
        DFC, WET (DRY)                   .928 ( .911)
        SCF, WET (DRY)                  1.000 ( .973)
        VOL (SCM)                         113.2
        SAM BLR (SCM)                       0.00
        KM  (MEASURED)                     16.43

   TEST NUMBER,                             096FET
   BAROMETER,              MM HG            733.6
   HUMIDITY,               G/KG              12.6
   TEMPERATURE,            DEG C             26.1
    CARBON DIOXIDE,         G/KM            117.2
   FUEL CONSUMPTION,       L/100KM           5.02

   HYDROCARBONS,           G/KM               .10
   CARBON MONOXIDE,        G/KM               .08
   OXIDES OF NITROGEN,     G/KM              1.77
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TABLE D-31. TEST NO. 101 EMISSIONS RESULTS

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                               FTP    VEHICLE EMISSIONS RESULTS
                                       PROJECT 11-5830-010

TEST NO.   101FTP   RUN   1            VEHICLE NO.10                         TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.       DATE    4/17/81                       ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8             BAG CART NO. 1 / CVS NO.  2           GASOLINE  EM-470-F
TRANSMISSION A3                        DYNO NO.      3                       ODOMETER 10623. KM( 6601. MILES)

BAROMETER 744.73 MM HG(29.32 IN HG)    DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  60. PCT             ABS. HUMIDITY 12.6 GM/KG              NOX HUMIDITY CORRECTION FACTOR  1.07
BAG RESULTS
   BAG NUMBER                                  1                 2                 3                 4
   DESCRIPTION                          COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)         787.4 (31.0)      792.5 (31.2)      774.7 (30.5)      787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)       782.3 (30.8)      787.4 (31.0)      767.1 (30.2)      782.3 (30.8)
   BLOWER INLET TEMP. DEG. C(DEG. F)      42.2 (108.0)      42.8 (109.0)      43.3 (110.0)      43.3 (110.0)
   BLOWER REVOLUTIONS                      40549.            69560.            40505.            69515.
   TOT FLOW STD. CU. METRES(SCF)          76.3 ( 2694.)    130.7 ( 4614.)     76.2 ( 2691.)    130.5 ( 4609.)
   HC  SAMPLE METER/RANGE/PPM            59.3/ 3/ 593.     24.9/ 3/ 249.     24.9/ 3/ 249.     20.2/ 3/ 202.
   HC  BCKGRD METER/RANGE/PPM             1.9/ 3/  19.      1.8/ 3/  18.      1.7/ 3/  17.      1.5/ 3/  15.
   CO  SAMPLE METER/RANGE/PPM            64.5/ 2/3371.     79.2/ 3/1828.     56.0/ 3/1393.     64.8/ 3/1657.
   CO  BCKGRD METER/RANGE/PPM              .1/ 2/   4.       .1/ 3/   2.       .1/ 3/   2.       .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT            95.6/ 3/ 1.80     59.1/ 3/ 1.05     83.3/ 3/ 1.54     58.8/ 3/ 1.04
   CO2 BCKGRD METER/RANGE/PCT             2.8/ 3/  .04      2.6/ 3/  .04      3.4/ 3/  .05      2.9/ 3/  .04
   NOX SAMPLE METER/RANGE/PPM            32.9/ 3/  99.     43.0/ 2/  43.     37.0/ 3/ 111.     44.4/ 2/  44.
   NOX BCKGRD METER/RANGE/PPM              .1/ 3/   0.       .9/ 2/   1.       .1/ 3/   0.       .6/ 2/   1.
   DILUTION FACTOR                          6.14             10.76              7.90             11.00
   HC  CONCENTRATION PPM                    579.              233.              234.              188.
   CO  CONCENTRATION PPM                   3186.             1754.             1323.             1590.
   CO2 CONCENTRATION PCT                    1.76              1.01              1.49              1.00
   NOX CONCENTRATION PPM                    98.4              42.2             110.7              43.9
   HC  MASS GRAMS                          25.47             17.53             10.29             14.18
   CO  MASS GRAMS                         282.95            266.79            117.38            241.53
   CO2 MASS GRAMS                         2458.3            2413.8            2082.9            2386.8
   NOX MASS GRAMS                          15.32             11.24             17.22             11.68

   HC  GRAMS/KM                             4.38              2.79              1.76              2.24
   CO  GRAMS/KM                            48.70             42.42             20.12             38.20
   CO2 GRAMS/KM                            423.1             383.8             357.0             377.5
   NOX GRAMS/KM                             2.64              1.79              2.95              1.85
   FUEL CONSUMPTION BY CB L/100KM          21.92             19.60             16.83             18.98

   RUN TIME              SECONDS            505.              868.              506.              868.
   MEASURED DISTANCE     KM                 5.81              6.29              5.83              6.32
   SCF, DRY                                 .964              .971              .966              .971
         DFC, WET (DRY)                            .881 ( .864)                        .896 ( .879)
         SCF, WET (DRY)                           1.000 ( .968)                       1.008 ( .969)
         VOL (SCM)                                      207.0                               206.7
         SAM BLR (SCM)                                   0.00                                0.00
         KM  (MEASURED)                                 12.10                               12.16
         FUEL CONSUMPTION L/100KM                       20.72                               17.95

COMPOSITE RESULTS                                                                          3-BAG      (4-BAG)
   TEST NUMBER          101FTP                                CARBON DIOXIDE      G/KM     394.6     ( 382.7)
   BAROMETER    MM HG   744.7                                 FUEL CONSUMPTION    L/100KM   19.32     ( 19.14)
   HUMIDITY     G/KG     12.6                                 HYDROCARBONS (THC)  G/KM      2.84     (  2.68)
   TEMPERATURE  DEG C    25.6                                 CARBON MONOXIDE     G/KM     37.60     ( 36.37)
                                                              OXIDES OF NITROGEN  G/KM      2.28     (  2.30)
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                               HFET   VEHICLE EMISSIONS RESULTS
                                       PROJECT 11-5830-010

TEST NO.   101FET   RUN   1            VEHICLE NO.10                         TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.       DATE    4/17/81                       ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8             BAG CART NO.  1                       GASOLINE  EM-470-F
TRANSMISSION A3                        DYNO NO.      3                       ODOMETER ****** KM(66020. MILES)
                                       CVS NO.   2

BAROMETER 744.73 MM HG(29.32 IN HG)    DRY BULB TEMP. 31.1 DEG C(88.0 DEG F)
RELATIVE HUMIDITY  41. PCT             ABS. HUMIDITY 11.8 GM/KG              NOX HUMIDITY CORRECTION FACTOR  1.04
0 BAG RESULTS
   TEST CYCLE                               HFET

   BLOWER DIF P MM. H2O(IN. H2O)         812.8 (32.0)
   BLOWER INLET P MM. H2O(IN. H2O)       800.1 (31.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)      43.3 (110.0)
   BLOWER REVOLUTIONS                      61284.
   TOT FLOW STD. CU. METRES(SCF)         114.7 ( 4052.)
   HC  SAMPLE METER/RANGE/PPM            10.6/ 3/ 106.
   HC  BCKGRD METER/RANGE/PPM             1.2/ 3/  12.
   CO  SAMPLE METER/RANGE/PPM            72.3/11/ 309.
   CO  BCKGRD METER/RANGE/PPM              .3/11/   1.
   CO2 SAMPLE METER/RANGE/PCT            50.7/ 2/ 2.28
   CO2 BCKGRD METER/RANGE/PCT             1.4/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM            36.6/ 3/ 110.
   NOX BCKGRD METER/RANGE/PPM              .1/ 3/   0.
   DILUTION FACTOR                          5.78
   HC  CONCENTRATION PPM                     96.
   CO  CONCENTRATION PPM                    291.
   CO2 CONCENTRATION PCT                    2.24
   NOX CONCENTRATION PPM                   109.6
   HC  MASS GRAMS                           6.36
   CO  MASS GRAMS                          38.89
   CO2 MASS GRAMS                         4698.3
   NOX MASS GRAMS                          24.89
   RUN TIME              SECONDS            765.
         DFC, WET (DRY)                  .827 ( .816)
         SCF, WET (DRY)                 1.000 ( .966)
         VOL (SCM)                          114.7
         SAM BLR (SCM)                       0.00
         KM  (MEASURED)                     16.65

   TEST NUMBER,                             101FET
   BAROMETER,           MM HG               744.7
   HUMIDITY,            G/KG                 11.8
   TEMPERATURE,         DEG C                31.1
    CARBON DIOXIDE,      G/KM               282.1
   FUEL CONSUMPTION,    L/100KM             12.25

   HYDROCARBONS,        G/KM                  .38
   CARBON MONOXIDE,     G/KM                 2.33
   OXIDES OF NITROGEN,  G/KM                 1.49
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TABLE D-32. TEST NO. 102 EMISSIONS RESULTS

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                              FTP    VEHICLE EMISSIONS RESULTS
                                      PROJECT 11-5830-010

TEST NO.   102FTP   RUN   1              VEHICLE NO.10                           TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.         DATE     4/20/81                        ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8               BAG CART NO. 1 / CVS NO.  2             GASOLINE  EM-470
TRANSMISSION A3                          DYNO NO.      3                         ODOMETER ****** KM(66045. MILES)

BAROMETER 740.16 MM HG(29.14 IN HG)      DRY BULB TEMP. 28.3 DEG C(83.0 DEG F)
RELATIVE HUMIDITY  52. PCT               ABS. HUMIDITY 13.1 GM/KG                NOX HUMIDITY CORRECTION FACTOR  1.08
BAG RESULTS
  BAG NUMBER                                   1                  2                   3                   4
  DESCRIPTION                           COLD TRANSIENT       STABILIZED         HOT TRANSIENT         STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          774.7 (30.5)       777.2 (30.6)        774.7 (30.5)        787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)        767.1 (30.2)       772.2 (30.4)        767.1 (30.2)        782.3 (30.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)       43.3 (110.0)        43.9 (111.0)        43.9 (111.0)
  BLOWER REVOLUTIONS                        40838.             69537.              40510.              69447.
  TOT FLOW STD. CU. METRES(SCF)           76.3 ( 2695.)     129.9 ( 4586.)       75.6 ( 2671.)      129.4 ( 4569.)
  HC  SAMPLE METER/RANGE/PPM             19.9/ 4/1990.      81.5/ 3/ 815.       14.4/ 4/1440.       64.2/ 3/ 642.
  HC  BCKGRD METER/RANGE/PPM               .1/ 4/  10.       1.9/ 3/  19.         .2/ 4/  20.        1.9/ 3/  19.
  CO  SAMPLE METER/RANGE/PPM             44.9/ 2/3400.      38.3/ 3/ 910.       58.2/ 3/1457.       97.6/ 3/2040.
  CO  BCKGRD METER/RANGE/PPM               .1/ 2/   4.        .4/ 3/   9.         .3/ 3/   7.         .3/ 3/   7.
  CO2 SAMPLE METER/RANGE/PCT             94.2/ 3/ 1.77      43.2/ 3/ 1.13       85.0/ 3/ 1.57       65.0/ 3/ 1.16
  CO2 BCKGRD METER/RANGE/PCT              3.2/ 3/  .05       2.6/ 3/  .04        2.9/ 3/  .04        2.7/ 3/  .04
  NOX SAMPLE METER/RANGE/PPM             33.4/ 3/ 100.      51.3/ 2/  51.       44.9/ 3/ 135.       61.4/ 2/  61.
  NOX BCKGRD METER/RANGE/PPM               .2/ 3/   1.        .4/ 2/   0.         .2/ 3/   1.         .8/ 2/   1.
  DILUTION FACTOR                             5.86              10.34                7.22                8.93
  HC  CONCENTRATION PPM                      1982.               798.               1423.                625.
  CO  CONCENTRATION PPM                      3224.               867.               1383.               2722.
  CO2 CONCENTRATION PCT                      1.73               1.09                1.54                1.13
  NOX CONCENTRATION PPM                      99.7               50.9               134.2                60.7
  HC  MASS GRAMS                            87.22              59.75               62.03               46.64
  CO  MASS GRAMS                           286.45             131.11              121.76              410.05
  CO2 MASS GRAMS                           2411.6             2593.9              2126.2              2668.0
  NOX MASS GRAMS                            15.78              13.71               21.04               16.28

  HC  GRAMS/KM                              15.01               9.57               10.67                7.49
  CO  GRAMS/KM                              49.29              20.99               20.94               65.83
  CO2 GRAMS/KM                              415.0              415.3               365.7               428.3
  NOX GRAMS/KM                               2.71               2.20                3.62                2.61
  FUEL CONSUMPTION BY CB L/100KM            23.05              20.43               18.46               23.71

  RUN TIME                  SECONDS          509.               868.                506.                867.
  MEASURED DISTANCE         KM               5.81               6.25                5.81                6.23
  SCF, DRY                                   .967               .973                .968                .972
       DFC, WET (DRY)                             .876 ( .861)                            .878 ( .863)
       SCF, WET (DRY)                            1.000 ( .970)                           1.000 ( .971)
       VOL (SCM)                                       206.2                                   205.0
       SAM BLR (SCM)                                    0.00                                    0.00
       KM  (MEASURED)                                  12.06                                   12.04
       FUEL CONSUMPTION L/100KM                        21.69                                   21.17
COMPOSITE RESULTS
    TEST NUMBER          102FTP                                                          3-BAG       (4-BAG)
    BAROMETER    MM HG   740.2                          CARBON DIOXIDE       G/KM        401.6       ( 405.4)
    HUMIDITY     G/KG     13.1                          FUEL CONSUMPTION     L/100KM     20.43       ( 21.40)
    TEMPERATURE  DEG C    28.3                          HYDROCARBONS (THC)   G/KM        11.00       ( 10.39)
                                                        CARBON MONOXIDE      G/KM        26.84       ( 40.06)
                                                        OXIDES OF NITROGEN   G/KM         2.69       (  2.82)
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                              HFET   VEHICLE EMISSIONS RESULTS
                                      PROJECT 11-5830-010

TEST NO.   102FET   RUN   1              VEHICLE NO.10
VEHICLE MODEL   78 CHRYSLER N.Y.         DATE     4/20/81                        TEST WEIGHT  2268. KG( 5000. LBS)
ENGINE 6.6 L(400. CID) V-8               BAG CART NO.  1                         ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
TRANSMISSION A3                          DYNO NO.      3                         GASOLINE  EM-470
                                         CVS NO.   2                             ODOMETER ****** KM(66061. MILES)

BAROMETER 740.16 MM HG(29.14 IN HG)      DRY BULB TEMP. 30.0 DEG C(86.0 DEG F)
RELATIVE HUMIDITY  39. PCT               ABS. HUMIDITY 10.8 GM/KG                NOX HUMIDITY CORRECTION FACTOR  1.00
0 BAG RESULTS
   TEST CYCLE                                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)             812.8 (32.0)
   BLOWER INLET P MM. H2O(IN. H2O)           807.7 (31.8)
   BLOWER INLET TEMP. DEG. C(DEG. F)          43.9 (111.0)
   BLOWER REVOLUTIONS                           61236.
   TOT FLOW STD. CU. METRES(SCF)             113.7 ( 4014.)
   HC  SAMPLE METER/RANGE/PPM                90.4/ 3/ 904.
   HC  BCKGRD METER/RANGE/PPM                 2.0/ 3/  20.
   CO  SAMPLE METER/RANGE/PPM                70.7/11/ 353.
   CO  BCKGRD METER/RANGE/PPM                 1.7/11/   8.
   CO2 SAMPLE METER/RANGE/PCT                52.5/ 2/ 2.38
   CO2 BCKGRD METER/RANGE/PCT                 1.6/ 2/  .06
   NOX SAMPLE METER/RANGE/PPM                46.4/ 3/ 139.
   NOX BCKGRD METER/RANGE/PPM                  .3/ 3/   1.
   DILUTION FACTOR                               5.34
   HC  CONCENTRATION PPM                         888.
   CO  CONCENTRATION PPM                         328.
   CO2 CONCENTRATION PCT                         2.33
   NOX CONCENTRATION PPM                        138.5
   HC  MASS GRAMS                               63.43
   CO  MASS GRAMS                               43.45
   CO2 MASS GRAMS                              4850.6
   NOX MASS GRAMS                               30.16
   RUN TIME                  SECONDS             765.
        DFC, WET (DRY)                       .813 ( .802)
        SCF, WET (DRY)                      1.000 ( .965)
        VOL (SCM)                               113.7
        SAM BLR (SCM)                            0.00
        KM  (MEASURED)                          16.47
   TEST NUMBER,                                102FET
   BAROMETER,              MM HG                740.2
   HUMIDITY,               G/KG                  10.8
   TEMPERATURE,            DEG C                 30.0
    CARBON DIOXIDE,         G/KM                294.6
   FUEL CONSUMPTION,       L/100KM              13.27

   HYDROCARBONS,           G/KM                  3.85
   CARBON MONOXIDE,        G/KM                  2.64
   OXIDES OF NITROGEN,     G/KM                  1.83
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TABKE D-33. TEST NO. 106 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-010

TEST NO.   106FTP   RUN   1              VEHICLE NO.10                        TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.         DATE     4/22/81                     ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8               BAG CART NO. 1 / CVS NO.  2          GASOLINE  EM-470
TRANSMISSION A3                          DYNO NO.       3                     ODOMETER ****** KM(66119. MILES)

BAROMETER 737.87 MM HG(29.05 IN HG)      DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  53. PCT               ABS. HUMIDITY 11.2 GM/KG             NOX HUMIDITY CORRECTION FACTOR  1.02
BAG RESULTS
   BAG NUMBER                                   1                 2                 3                 4
   DESCRIPTION                           COLD TRANSIENT      STABILIZED      HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)         772.2 (30.4)      787.4 (31.0)      787.4 (31.0)      792.5 (31.2)
   BLOWER INLET P MM. H2O(IN. H2O)       767.1 (30.2)      782.3 (30.8)      782.3 (30.8)      787.4 (31.0)
   BLOWER INLET TEMP  DEG. C(DEG. F)      43.3 (110.0)      43.3 (110.0)      43.3 (110.0)      43.3 (110.0)
   BLOWER REVOLUTIONS                       40515.            69574.            40476.            69455.
   TOT FLOW STD. CU. METRES(SCF)          75.5 ( 2665.)    129.3 ( 4566.)     75.2 ( 2654.)    129.0 ( 4555.)
   HC   SAMPLE METER/RANGE/PPM           23.1/ 3/ 231.     61.6/ 2/  62.     10.6/ 3/ 106.     31.3/ 2/  31.
   HC   BCKGRD METER/RANGE/PPM            1.4/ 3/  14.     12.5/ 2/  13.      1.2/ 3/  12.     12.0/ 2/  12.
   CO   SAMPLE METER/RANGE/PPM           81.7/ 3/2221.     89.6/12/ 220.     91.7/12/ 227.     45.8/13/  43.
   CO   BCKGRD METER/RANGE/PPM             .3/ 3/   7.      1.7/12/   3.      1.5/12/   3.      2.8/13/   3.
   CO2  SAMPLE METER/RANGE/PCT           95.7/ 3/ 1.80     65.1/ 3/ 1.16     86.9/ 3/ 1.61     64.3/ 3/ 1.15
   CO2  BCKGRD METER/RANGE/PCT            3.4/ 3/  .05      3.2/ 3/  .05      3.7/ 3/  .06      3.8/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM           80.6/ 2/  81.     38.9/ 2/  39.     94.1/ 2/  94.     41.5/ 2/  42.
   NOX  BCKGRD METER/RANGE/PPM            1.0/ 2/   1.       .9/ 2/   1.      1.1/ 2/   1.      1.1/ 2/   1.
   DILUTION FACTOR                          6.60             11.24              8.14             11.59
   HC   CONCENTRATION PPM                  219.               50.               95.               20.
   CO   CONCENTRATION PPM                 2100.              208.              214.               39.
   CO2  CONCENTRATION PCT                   1.75              1.12              1.56              1.10
   NOX  CONCENTRATION PPM                  79.8              38.1              93.1              40.5
   HC   MASS GRAMS                          9.54              3.74              4.14              1.51
   CO   MASS GRAMS                        184.54             31.37             18.71              5.86
   CO2  MASS GRAMS                       2423.2            2652.3            2153.5            2587.4
   NOX  MASS GRAMS                         11.72              9.59             13.64             10.17

   HC   GRAMS/KM                            1.63               .59               .71               .24
   CO   GRAMS/KM                           31.52              4.97              3.20               .93
   CO2  GRAMS/KM                          413.9             420.1             368.3             410.8
   NOX  GRAMS/KM                            2.00              1.52              2.33              1.61
   FUEL CONSUMPTION BY CB L/100KM          20.00             18.34             16.03             17.63

   RUN TIME           SECONDS              505.              868.              505.              867.
   MEASURED DISTANCE  KM                   5.85              6.31              5.85              6.30
   SCF, DRY                                .966              .972              .968              .972
        DFC, WET (DRY)                            .888 ( .873)                        .900 ( .885)
        SCF, WET (DRY)                           1.000 ( .970)                       1.000 ( .971)
        VOL (SCM)                                       204.8                               204.2
        SAM BLR (SCM)                                    0.00                                0.00
        KM  (MEASURED)                                  12.17                               12.14
        FUEL CONSUMPTION L/100KM                        19.14                               16.86

COMPOSITE RESULTS                                                                         3-BAG       (4-BAG)
   TEST NUMBER          106FTP                          CARBON DIOXIDE       G/KM         404.6     ( 401.9)
   BAROMETER    MM HG   737.9                           FUEL CONSUMPTION     L/100KM      18.05     ( 17.84)
   HUMIDITY     G/KG     11.2                           HYDROCARBONS (THC)   G/KM           .84     (   .73)
   TEMPERATURE  DEG C    25.6                           CARBON MONOXIDE      G/KM          9.90     (  8.78)
                                                        OXIDES OF NITROGEN   G/KM          1.84     (  1.87)
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                                   HFET   VEHICLE EMISSIONS RESULTS
                                            PROJECT 11-5830-010

TEST NO.   106FET   RUN   1              VEHICLE NO.10                        TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.         DATE     4/22/81                     ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8               BAG CART NO.  1                      GASOLINE  EM-470
TRANSMISSION A3                          DYNO NO.       3                     ODOMETER ****** KM(66124. MILES)
                                         CVS NO.   2

BAROMETER 737.87 MM HG(29.05 IN HG)      DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  45. PCT               ABS. HUMIDITY 10.0 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .98
0 BAG RESULTS
   TEST CYCLE                                HFET

   BLOWER DIF P MM. H2O(IN. H2O)         800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)       792.5 (31.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)      43.3 (110.0)
   BLOWER REVOLUTIONS                       61282.
   TOT FLOW STD. CU. METRES(SCF)         113.7 ( 4015.)
   HC   SAMPLE METER/RANGE/PPM           46.0/ 2/  46.
   HC   BCKGRD METER/RANGE/PPM           12.7/ 2/  13.
   CO   SAMPLE METER/RANGE/PPM           82.6/13/  82.
   CO   BCKGRD METER/RANGE/PPM            2.5/13/   2.
   CO2  SAMPLE METER/RANGE/PCT           50.3/ 2/ 2.26
   CO2  BCKGRD METER/RANGE/PCT            1.7/ 2/  .06
   NOX  SAMPLE METER/RANGE/PPM           89.5/ 2/  90.
   NOX  BCKGRD METER/RANGE/PPM             .8/ 2/   1.
   DILUTION FACTOR                          5.91
   HC   CONCENTRATION PPM                   35.
   CO   CONCENTRATION PPM                   75.
   CO2  CONCENTRATION PCT                   2.21
   NOX  CONCENTRATION PPM                  88.8
   HC   MASS GRAMS                          2.32
   CO   MASS GRAMS                          9.99
   CO2  MASS GRAMS                       4591.7
   NOX  MASS GRAMS                         18.90
   RUN TIME                SECONDS         765.
        DFC, WET (DRY)                   .831 ( .819)
        SCF, WET (DRY)                  1.000 ( .965)
        VOL (SCM)                          113.7
        SAM BLR (SCM)                       0.00
        KM  (MEASURED)                     16.43

   TEST NUMBER,                            106FET
   BAROMETER,              MM HG            737.9
   HUMIDITY,               G/KG              10.0
   TEMPERATURE,            DEG C             26.7
    CARBON DIOXIDE,         G/KM            279.5
   FUEL CONSUMPTION,       L/100KM          11.99

   HYDROCARBONS,           G/KM               .14
   CARBON MONOXIDE,        G/KM               .61
   OXIDES OF NITROGEN,     G/KM              1.15
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TABLE D-34. TEST NO. 107 EMISSIONS RESULTS

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                                        FTP   VEHICLE EMISSIONS RESULTS
                                              PROJECT 11-5830-010

TEST NO.   107FTP   RUN   1                VEHICLE NO.10                    TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.           DATE    4/23/81                  ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8                 BAG CART NO. 1 / CVS NO.  2      GASOLINE  EM-470
TRANSMISSION A3                            DYNO NO.      3                  ODOMETER ###### KM(66182. MILES)

BAROMETER 736.60 MM HG(29.00 IN HG)        DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
RELATIVE HUMIDITY  66. PCT                 ABS. HUMIDITY 12.2 GM/KG         NOX HUMIDITY CORRECTION FACTOR  1.05
BAG RESULTS
  BAG NUMBER                                     1                2                  3                  4
  DESCRIPTION                              COLD TRANSIENT     STABILIZED       HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)            782.3 (30.8)      787.4 (31.0)      782.3 (30.8)      787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)          777.2 (30.6)      782.3 (30.8)      777.2 (30.6)      782.3 (30.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)      43.3 (110.0)      43.3 (110.0)      43.3 (110.0)
  BLOWER REVOLUTIONS                          40555.            69593.            40490.            69532.
  TOT FLOW STD. CU. METRES(SCF)             75.3 ( 2659.)    129.1 ( 4559.)     75.2 ( 2655.)    129.0 ( 4554.)
  HC   SAMPLE METER/RANGE/PPM              23.5/ 3/ 235.     64.1/ 2/  64.     92.4/ 2/  92.     45.2/ 2/  45.
  HC   BCKGRD METER/RANGE/PPM               1.4/ 3/  14.     14.9/ 2/  15.     14.2/ 2/  14.     16.6/ 2/  17.
  CO   SAMPLE METER/RANGE/PPM              86.2/ 3/2386.     84.4/12/ 209.     92.9/12/ 231.     52.2/12/ 111.
  CO   BCKGRD METER/RANGE/PPM                .1/ 3/   2.      1.1/12/   2.       .8/12/   1.       .7/12/   1.
  CO2  SAMPLE METER/RANGE/PCT              95.5/ 3/ 1.79     63.8/ 3/ 1.14     86.1/ 3/ 1.60     62.9/ 3/ 1.12
  CO2  BCKGRD METER/RANGE/PCT               3.7/ 3/  .06      3.0/ 3/  .05      2.8/ 3/  .04      3.3/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM              78.2/ 2/  78.     39.9/ 2/  40.     32.6/ 3/  98.     41.5/ 2/  42.
  NOX  BCKGRD METER/RANGE/PPM               1.1/ 2/   1.      1.4/ 2/   1.       .3/ 3/   1.       .8/ 2/   1.
  DILUTION FACTOR                                6.56             11.50              8.23             11.80
  HC   CONCENTRATION PPM                        223.               50.               80.               30.
  CO   CONCENTRATION PPM                       2251.              199.              218.              105.
  CO2  CONCENTRATION PCT                        1.75              1.10              1.56              1.07
  NOX  CONCENTRATION PPM                        77.3              38.6              97.0              40.8
  HC   MASS GRAMS                               9.69              3.76              3.46              2.23
  CO   MASS GRAMS                             197.34             29.84             19.06             15.83
  CO2  MASS GRAMS                             2406.4            2592.7            2145.9            2537.5
  NOX  MASS GRAMS                              11.71             10.04             14.69             10.59

  HC   GRAMS/KM                                 1.65               .60               .59               .35
  CO   GRAMS/KM                                33.67              4.73              3.24              2.51
  CO2  GRAMS/KM                                410.5             410.8             365.2             402.1
  NOX  GRAMS/KM                                 2.00              1.59              2.50              1.68
  FUEL CONSUMPTION BY CB L/100KM               20.00             17.93             15.89             17.38

  RUN TIME                SECONDS              505.              868.              505.              868.
  MEASURED DISTANCE       KM                   5.86              6.31              5.88              6.31
  SCF, DRY                                     .962              .968              .964              .968
        DFC, WET (DRY)                               .889 ( .870)                        .902 ( .883)
        SCF, WET (DRY)                              1.000 ( .966)                       1.000 ( .967)
        VOL (SCM)                                          204.4                               204.2
        SAM BLR (SCM)                                       0.00                                0.00
        KM  (MEASURED)                                     12.17                               12.19
        FUEL CONSUMPTION L/100KM                           18.93                               16.66

COMPOSITE RESULTS                                                                                3-BAG       (4-BAG)
  TEST NUMBER           107FTP                             CARBON DIOXIDE        G/KM          398.2      ( 395.6)
  BAROMETER     MM HG   736.6                              FUEL CONSUMPTION      L/100KM       17.80    . ( 17.63)
  HUMIDITY      G/KG     12.2                              HYDROCARBONS (THC)    G/KM            .81      (   .74)
  TEMPERATURE   DEG C    23.3                              CARBON MONOXIDE       G/KM          10.31      (  9.66)
                                                           OXIDES OF NITROGEN    G/KM           1.92      (  1.95)
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                                        HFET   VEHICLE EMISSIONS RESULTS
                                               PROJECT 11-5830-010

TEST NO.   107FET   RUN   1                VEHICLE NO.10                    TEST WEIGHT  2268. KG( 5000. LBS)
VEHICLE MODEL   78 CHRYSLER N.Y.           DATE    4/23/81                  ACTUAL ROAD LOAD   8.4 KW( 11.3 HP)
ENGINE 6.6 L(400. CID) V-8                 BAG CART NO.  1                  GASOLINE  EM-470
TRANSMISSION A3                            DYNO NO.      3                  ODOMETER ###### KM(66196. MILES)
                                           CVS NO.   2

BAROMETER 737.36 MM HG(29.03 IN HG)        DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  53. PCT                 ABS. HUMIDITY 11.3 GM/KG         NOX HUMIDITY CORRECTION FACTOR  1.02
0 BAG RESULTS
  TEST CYCLE                                  HFET

  BLOWER DIF P MM. H2O(IN. H2O)            807.7 (31.8)
  BLOWER INLET P MM. H2O(IN. H2O)          800.1 (31.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)
  BLOWER REVOLUTIONS                          61296.
  TOT FLOW STD. CU. METRES(SCF)            113.5 ( 4009.)
  HC   SAMPLE METER/RANGE/PPM              50.8/ 2/  51.
  HC   BCKGRD METER/RANGE/PPM              15.4/ 2/  15.
  CO   SAMPLE METER/RANGE/PPM              95.6/13/  97.
  CO   BCKGRD METER/RANGE/PPM               1.3/13/   1.
  CO2  SAMPLE METER/RANGE/PCT              50.2/ 2/ 2.25
  CO2  BCKGRD METER/RANGE/PCT               1.5/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM              32.7/ 3/  98.
  NOX  BCKGRD METER/RANGE/PPM                .3/ 3/   1.
  DILUTION FACTOR                                5.92
  HC   CONCENTRATION PPM                         38.
  CO   CONCENTRATION PPM                         90.
  CO2  CONCENTRATION PCT                        2.21
  NOX  CONCENTRATION PPM                        97.4
  HC   MASS GRAMS                               2.49
  CO   MASS GRAMS                              11.92
  CO2  MASS GRAMS                             4585.0
  NOX  MASS GRAMS                              21.52
  RUN TIME                SECONDS              766.
        DFC, WET (DRY)                     .831 ( .817)
        SCF, WET (DRY)                    1.000 ( .962)
        VOL (SCM)                                113.5
        SAM BLR (SCM)                             0.00
        KM  (MEASURED)                           16.48

  TEST NUMBER,                                 107FET
  BAROMETER,              MM HG                 737.4
  HUMIDITY,               G/KG                   11.3
  TEMPERATURE,            DEG C                  25.6
   CARBON DIOXIDE,         G/KM                 278.2
  FUEL CONSUMPTION,       L/100KM               11.94

  HYDROCARBONS,           G/KM                    .15
  CARBON MONOXIDE,        G/KM                    .72
  OXIDES OF NITROGEN,     G/KM                   1.31
```

APPENDIX E

I/M SHORT TEST RESULTS

TABLE E-1. CAR 01 I/M SHORT TEST RESULTS
1978 BUICK REGAL

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	012	
50 mph[a] - 1700 rpm	68	
Idle - Neutral	75	
2500 rpm	67	
Idle - Neutral	69	
Idle - Drive	68	
30 mph[a] - 1100 rpm	83	
Idle - Neutral	85	
CO Emissions Percent		
50 mph[a]	0.01	
Idle - Neutral	0.02	
2500 rpm	0.02	
Idle - Neutral	0.01	
Idle - Drive	0.01	
30 mph[a]	0.03	
Idle - Neutral	0.01	
Propane Enrichment, rpm		
In Neutral		
PCV in Place	760	
As Above with Propane	820	
PCV Valve Removed from Grommet	750	
As Above with Propane	840	
PCV Fresh Air Line Removed	750	
As Above with Propane	820	
In Drive		
PCV in Place	560	
As Above with Propane	570	
PCV Valve Removed from Gormmet	570	
As Above with Propane	580	
PCV Fresh Air Line Removed	560	
As Above with Propane	570	

---

[a] In Drive

TABLE E-2. CAR 02 I/M SHORT TEST RESULTS
1979 MERCURY MARQUIS

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	022	
50 mph[a] - 1500 rpm	73	
Idle - Neutral	107	
2500 rpm	67	
Idle - Neutral	81	
Idle - Drive	89	
30 mph[a] - 1050 rpm	91	
Idle - Neutral	86	
CO Emissions Percent		
50 mph[a]	0.00	
Idle - Neutral	0.10	
2500 rpm	0.02	
Idle - Neutral	0.02	
Idle - Drive	0.10	
30 mph[a]	0.01	
Idle - Neutral	0.02	
Propane Enrichment, rpm		
In Neutral		
PCV in Place	880	
As Above with Propane	920	
PCV Valve Removed from Grommet	890	
As Above with Propane	940	
PCV Fresh Air Line Removed	870	
As Above with Propane	920	
In Drive		
PCV in Place	600	
As Above with Propane	600	
PCV Valve Removed from Gormmet	610	
As Above with Propane	610	
PCV Fresh Air Line Removed	600	
As Above with Propane	600	

---

[a] In Drive

TABLE E-3. CAR 03 I/M SHORT TEST RESULTS
1979 MERCURY MARQUIS

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	032	037
50 mph[a] - 1500 rpm	63	58
Idle - Neutral	315	383
2500 rpm	98	93
Idle - Neutral	164	166
Idle - Drive	107	121
30 mph[a] - 1050 rpm	116	130
Idle - Neutral	130	164
CO Emissions Percent		
50 mph[a]	0.01	0.00
Idle - Neutral	2.46	2.31
2500 rpm	0.27	0.26
Idle - Neutral	0.43	0.32
Idle - Drive	0.29	0.26
30 mph[a]	0.29	0.36
Idle - Neutral	0.24	0.21
Propane Enrichment, rpm		
In Neutral		
PCV in Place	1050	975
As Above with Propane	1060	985
PCV Valve Removed from Grommet	1070	970
As Above with Propane	1080	1050
PCV Fresh Air Line Removed	1050	960
As Above with Propane	1060	980
In Drive		
PCV in Place	640	620
As Above with Propane	640	620
PCV Valve Removed from Gormmet	650	630
As Above with Propane	650	630
PCV Fresh Air Line Removed	640	620
As Above with Propane	640	620

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[a] In Drive

TABLE E-4. CAR 04 I/M SHORT TEST RESULTS
1978 FORD GRANADA

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	041	047
50 mph[a] - 1800 rpm	82	82
Idle - Neutral	109	146
2500 rpm	102	198
Idle - Neutral	100	107
Idle - Drive	93	84
30 mph[a] - 1150 rpm	224	175
Idle - Neutral	84	100
CO Emissions Percent		
50 mph[a]	0.01	0.01
Idle - Neutral	0.04	0.00
2500 rpm	0.05	0.01
Idle - Neutral	0.01	0.01
Idle - Drive	0.01	0.00
30 mph[a]	0.02	0.01
Idle - Neutral	0.01	0.00
Propane Enrichment, rpm		
In Neutral		
PCV in Place	1050	800
As Above with Propane	1260	1100
PCV Valve Removed from Grommet	1055	765
As Above with Propane	1280	1160
PCV Fresh Air Line Removed	1070	800
As Above with Propane	1280	1100
In Drive		
PCV in Place	680	610
As Above with Propane	710	660
PCV Valve Removed from Gormmet	680	570
As Above with Propane	710	675
PCV Fresh Air Line Removed	685	610
As Above with Propane	710	660

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[a] In Drive

TABLE E-5. CAR 05 I/M SHORT TEST RESULTS
1978 VOLVO 245DL CAL.

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	052	056
50 mph[a] - 2750 rpm	62	69
Idle - Neutral	98	89
2500 rpm	75	84
Idle - Neutral	91	93
Idle - Drive	93	84
30 mph[a] - 2250 rpm	82	82
Idle - Neutral	98	98
CO Emissions Percent		
50 mph[a]	0.02	0.01
Idle - Neutral	0.18	0.06
2500 rpm	0.17	0.07
Idle - Neutral	0.15	0.10
Idle - Drive	0.19	0.07
30 mph[a]	0.07	0.05
Idle - Neutral	0.18	0.06
Propane Enrichment, rpm		
In Neutral		
PCV in Place	1080	900
As Above with Propane	1280	1140
PCV Valve Removed from Grommet	1130	940
As Above with Propane	1300	1160
PCV Fresh Air Line Removed	1100	890
As Above with Propane	1300	1135
In Drive		
PCV in Place		
As Above with Propane		
PCV Valve Removed from Gormmet		
As Above with Propane		
PCV Fresh Air Line Removed		
As Above with Propane		

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[a] In Drive

TABLE E-6. CAR 06 I/M SHORT TEST RESULTS
1978 OLDSMOBILE CUTLASS

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	061	067
50 mph[a] - 2000 rpm	73	62
Idle - Neutral	64	82
2500 rpm	60	64
Idle - Neutral	62	78
Idle - Drive	62	62
30 mph[a] - 1250 rpm	69	60
Idle - Neutral	67	62
CO Emissions Percent		
50 mph[a]	0.05	0.01
Idle - Neutral	0.01	0.00
2500 rpm	0.07	0.01
Idle - Neutral	0.01	0.01
Idle - Drive	0.01	0.00
30 mph[a]	0.01	0.01
Idle - Neutral	0.02	0.01
Propane Enrichment, rpm		
In Neutral		
PCV in Place	910	900
As Above with Propane	1040	1130
PCV Valve Removed from Grommet	910	910
As Above with Propane	1030	1140
PCV Fresh Air Line Removed	880	880
As Above with Propane	1090	1190
In Drive		
PCV in Place	640	640
As Above with Propane	660	695
PCV Valve Removed from Gormmet	640	650
As Above with Propane	660	700
PCV Fresh Air Line Removed	625	620
As Above with Propane	680	710

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[a] In Drive

TABLE E-7. CAR 07 I/M SHORT TEST RESULTS
1978 CHEVROLET MALIBU CAL.

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	071	078
50 mph[a] - 1700 rpm	60	67
Idle - Neutral	64	87
2500 rpm	64	152
Idle - Neutral	64	116
Idle - Drive	82	-
30 mph[a] - 1100 rpm	67	84
Idle - Neutral	64	212
CO Emissions Percent		
50 mph[a]	0.01	0.03
Idle - Neutral	0.05	0.04
2500 rpm	0.02	0.03
Idle - Neutral	0.06	0.03
Idle - Drive	0.09	-
30 mph[a]	0.09	0.02
Idle - Neutral	0.05	0.03
Propane Enrichment, rpm		
In Neutral		
PCV in Place	980	640
As Above with Propane	1000	810
PCV Valve Removed from Grommet	975	630
As Above with Propane	1010	850
PCV Fresh Air Line Removed	950	650
As Above with Propane	980	810
In Drive		
PCV in Place	630	560
As Above with Propane	630	625
PCV Valve Removed from Gormmet	630	550
As Above with Propane	640	640
PCV Fresh Air Line Removed	610	560
As Above with Propane	620	625

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[a] In Drive

TABLE E-8. CAR 08 I/M SHORT TEST RESULTS
1978 MONTE CARLO

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	081	086
50 mph^a - 1800 rpm	64	60
Idle - Neutral	102	91
2500 rpm	56	89
Idle - Neutral	100	93
Idle - Drive	62	58
30 mph^a - 1150 rpm	58	67
Idle - Neutral	114	125
CO Emissions Percent		
50 mph^a	0.00	0.02
Idle - Neutral	0.08	0.01
2500 rpm	0.01	0.48
Idle - Neutral	0.05	0.01
Idle - Drive	0.01	0.04
30 mph^a	0.00	0.01
Idle - Neutral	0.01	0.01
Propane Enrichment, rpm		
In Neutral		
PCV in Place	970	870
As Above with Propane	1600	1150
PCV Valve Removed from Grommet	1000	855
As Above with Propane	1550	1170
PCV Fresh Air Line Removed	980	890
As Above with Propane	1550	1145
In Drive		
PCV in Place	670	640
As Above with Propane	800	675
PCV Valve Removed from Gormmet	630	620
As Above with Propane	810	685
PCV Fresh Air Line Removed	680	630
As Above with Propane	800	675

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[a] In Drive

TABLE E-9. CAR 09 I/M SHORT TEST RESULTS
1978 FORD FIESTA

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	092	096
50 mph[a] - 2625 rpm	109	107
Idle - Neutral	400	476
2500 rpm	102	152
Idle - Neutral	372	332
Idle - Drive	150	389
30 mph[a] - 2300 rpm	221	134
Idle - Neutral	75	107
CO Emissions Percent		
50 mph[a]	0.00	0.00
Idle - Neutral	1.94	1.33
2500 rpm	0.03	0.10
Idle - Neutral	0.19	0.19
Idle - Drive	0.09	0.14
30 mph[a]	0.03	0.06
Idle - Neutral	0.02	0.02
Propane Enrichment, rpm		
In Neutral		
PCV in Place	975	830
As Above with Propane	980	870
PCV Valve Removed from Grommet	950	830
As Above with Propane	1040	940
PCV Fresh Air Line Removed	930	820
As Above with Propane	960	860
In Drive		
PCV in Place		
As Above with Propane		
PCV Valve Removed from Gormmet		
As Above with Propane		
PCV Fresh Air Line Removed		
As Above with Propane		

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[a] In Drive

TABLE E-10. CAR 10 I/M SHORT TEST RESULTS
1978 CHRYSLER NEW YORKER

	Car As-Received	Car Tuned-Up
HC, Emissions, rpm Hexane	102	107
50 mph[a] - 2000 rpm	483+	64
Idle - Neutral	483+	193
2500 rpm	483+	107
Idle - Neutral	483+	84
Idle - Drive	483+	75
30 mph[a] - 1160 rpm	483+	100
Idle - Neutral	483+	84
CO Emissions Percent		
50 mph[a]	0.02	0.02
Idle - Neutral	1.24	0.08
2500 rpm	0.16	0.03
Idle - Neutral	0.59	0.08
Idle - Drive	0.46	0.04
30 mph[a]	0.14	0.17
Idle - Neutral	0.47	0.08
Propane Enrichment, rpm		
In Neutral		
PCV in Place	815	755
As Above with Propane	815	845
PCV Valve Removed from Grommet	820	760
As Above with Propane	850	850
PCV Fresh Air Line Removed	815	765
As Above with Propane	820	825
In Drive		
PCV in Place	650	620
As Above with Propane	650	640
PCV Valve Removed from Gormmet	650	615
As Above with Propane	655	655
PCV Fresh Air Line Removed	645	620
As Above with Propane	650	645

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[a] In Drive

APPENDIX F

AVERAGE VALUES FOR FTP AND HFET RESULTS

TABLE F-1. CAR 01 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	011-012		011-012	
Barometer,	mm Hg	744.2		744.1	
Humidity,	g/kg	5.6		5.5	
Temperature,	°C	21.1		22.0	
Total Fuel Sulfur,	mg/km	22.71		15.63	
Avg. Exh. Oxygen,	%	0.61		0.85	
Carbon Dioxide,	g/km	300.7		223.2	
Fuel Cons.,	ℓ/100 km	13.95		9.60	
Regulated Emissions					
Hydrocarbons (THC),	g/km	1.06		0.18	
Carbon Monoxide,	g/km	14.55		0.67	
Oxides of Nitrogen,	g/km	0.94		0.89	
Particulates		31.22		17.42	
Total Particulates					
Compound Group Totals					
Aldehydes & Ketones		10.5		5.1	
Individual Hydrocarbons		360.9		75.9	
Organic Sulfides		0.22		0.01	
Organic Amines		0.05		0.02	
Other Compounds					
Ammonia		6.31		2.44	
Cyanide & Cyanogen		1.99		0.93	
Hydrogen Sulfide		0.00		0.00	
Nitrous Oxide		26.40		9.78	
Aldehydes & Ketones					
Formaldehyde		8.83		3.73	
Acetaldehyde		1.62		0.93	
Acetone		0.00		0.38	
Methylethylketone		0.00		0.00	
Hexanaldehyde		0.00		0.00	

TABLE F-1 (Cont'd). CAR 01 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	011-012		011-012	
Individual Hydrocarbons				
Methane	68.31		23.48	
Ethylene	87.73		15.05	
Ethane	16.63		8.86	
Acetylene	18.70		0.52	
Propane	0.75		0.15	
Propylene	39.46		8.84	
Benzene	54.08		9.43	
Toluene	75.23		9.56	
Organic Sulfides				
Carbonyl Sulfide	0.15		0.00	
Methyl Sulfide	0.07		0.01	
Ethyl Sulfide	0.01		0.00	
Methyl Disulfide	0.00		0.00	
Organic Amines				
Monomethylamine	0.03		0.01	
Monoethylamine	0.02		0.01	
Trimethylamine	0.01		0.00	
Diethylamine	0.00		0.00	
Triethylamine	0.00		0.00	
Trace Elements[a]				
Sodium	0.01		0.00	
Sulfur	0.03		0.07	
Vanadium	0.00		0.00	
Magnesium	0.01		0.01	
Chlorine	0.01		0.02	
Aluminum	0.01		0.01	
Manganese	0.00		0.00	
Zinc	0.02		0.00	
Silicon	0.02		0.05	
Calcium	0.04		0.02	
Iron	0.12		0.07	
Phosphorus	0.02		0.01	
Titanium	0.00		0.00	
Bromine	0.00		0.00	

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-2. CAR 02 AVERAGE FTP AND HFET RESULTS
FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	021-022		021-022	
Barometer,	mm Hg	754.5		754.8	
Humidity,	g/kg	3.6		3.8	
Temperature,	°C	20.3		22.5	
Total Fuel Sulfur,	mg/km	27.09		17.57	
Avg. Exh. Oxygen,	%	5.23		4.65	
Carbon Dioxide,	g/km	383.0		251.8	
Fuel Cons.,	ℓ/100 km	16.64		10.79	
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.43		0.16	
Carbon Monoxide,	g/km	3.48		0.29	
Oxides of Nitrogen,	g/km	1.43		1.27	
Particulates					
Total Particulates		16.75		38.36	
Compound Group Totals					
Aldehydes & Ketones		0.3		2.2	
Individual Hydrocarbons		167.1		64.3	
Organic Sulfides		0.45		0.04	
Organic Amines		0.00		0.00	
Other Compounds					
Ammonia		12.27		6.15	
Cyanide & Cyanogen		0.12		0.19	
Hydrogen Sulfide		0.00		0.00	
Nitrous Oxide		58.55		36.21	
Aldehydes & Ketones					
Formaldehyde		0.00		2.14	
Acetaldehyde		0.30		0.00	
Acetone		0.00		0.00	
Methylethylketone		0.00		0.00	
Hexanaldehyde		0.00		0.00	

TABLE F-2 (Cont'd). CAR 02 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	021-022		021-022	
Individual Hydrocarbons				
Methane	85.36		35.83	
Ethylene	25.58		10.97	
Ethane	15.24		9.85	
Acetylene	7.22		0.00	
Propane	0.85		0.51	
Propylene	5.65		1.67	
Benzene	11.09		3.10	
Toluene	16.09		2.42	
Organic Sulfides				
Carbonyl Sulfide	0.44		0.04	
Methyl Sulfide	0.01		0.00	
Ethyl Sulfide	0.00		0.00	
Methyl Disulfide	0.00		0.00	
Organic Amines				
Monomethylamine	0.00		0.00	
Monoethylamine	0.00		0.00	
Trimethylamine	0.00		0.00	
Diethylamine	0.00		0.00	
Triethylamine	0.00		0.00	
Trace Elements[a]				
Sodium	0.00		0.00	
Sulfur	0.37		3.30	
Vanadium	0.00		0.00	
Magnesium	0.00		0.00	
Chlorine	0.01		0.00	
Aluminum	0.01		0.01	
Manganese	0.00		0.00	
Zinc	0.00		0.00	
Silicon	0.11		0.03	
Calcium	0.02		0.01	
Iron	0.20		0.05	
Phosphorus	0.00		0.00	
Titanium	0.00		0.00	
Bromine	0.00		0.00	

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-3. CAR 03 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	031-032	036-037	031-032	036-037
Barometer,	mm Hg	734.5	758.5	746.8	758.5
Humidity,	g/kg	7.9	2.2	8.1	2.0
Temperature,	°C	20.9	20.6	23.1	23.1
Total Fuel Sulfur,	mg/km	28.08	26.87	18.06	17.39
Avg. Exh. Oxygen,	%	4.45	5.29	4.20	4.94
Carbon Dioxide,	g/km	397.1	381.6	256.9	249.2
Fuel Cons.,	ℓ/100 km	17.25	16.50	11.09	10.68
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.42	0.42	0.17	0.11
Carbon Monoxide,	g/km	3.68	2.41	1.59	0.40
Oxides of Nitrogen,	g/km	1.03	1.07	1.56	1.43
Particulates					
Total Particulates		23.71	15.84	21.51	11.06
Compound Group Totals					
Aldehydes & Ketones		3.9	1.8	0.0	3.3
Individual Hydrocarbons		163.4	177.2	66.8	52.7
Organic Sulfides		0.55	0.12	0.16	0.08
Organic Amines		0.03	0.01	0.00	0.00
Other Compounds					
Ammonia		1.45	3.37	3.31	3.42
Cyanide & Cyanogen		0.07	0.32	0.38	0.03
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Nitrous Oxide		53.41	49.10	67.62	61.04
Aldehydes & Ketones					
Formaldehyde		2.88	0.94	0.00	3.24
Acetaldehyde		1.03	0.00	0.00	0.00
Acetone		0.00	0.00	0.00	0.00
Methylethylketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.00

TABLE F-3 (Cont'd). CAR 03 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	031-032	036-037	031-032	036-037
Individual Hydrocarbons				
Methane	87.08	100.85	35.09	37.78
Ethylene	16.06	16.02	9.22	3.27
Ethane	12.64	14.36	8.67	7.61
Acetylene	7.13	5.28	0.00	0.00
Propane	0.15	1.17	0.00	0.00
Propylene	4.16	4.20	2.00	0.00
Benzene	13.23	11.49	5.05	2.04
Toluene	22.93	23.82	6.71	1.98
Organic Sulfides				
Carbonyl Sulfide	0.50	0.10	0.13	0.06
Methyl Sulfide	0.05	0.02	0.03	0.02
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.02	0.01	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.02	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sodium	0.00	0.00	0.00	0.00
Sulfur	0.12	0.20	0.28	0.89
Vanadium	0.00	0.00	0.00	0.00
Magnesium	0.00	0.01	0.00	0.00
Chlorine	0.04	0.01	0.01	0.00
Aluminum	0.03	0.11	0.01	0.01
Manganese	0.00	0.01	0.00	0.00
Zinc	0.00	0.00	0.00	0.00
Silicon	0.16	0.10	0.07	0.02
Calcium	0.02	0.04	0.02	0.01
Iron	0.50	0.95	0.11	0.07
Phosphorus	0.01	0.02	0.00	0.00
Titanium	0.02	0.00	0.02	0.00
Bromine	0.17	0.04	0.06	0.00

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-4. CAR 04 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	041-042	046	041-042	046
Barometer,	mm Hg	742.5	742.2	742.6	742.2
Humidity,	g/kg	9.1	11.4	9.7	12.2
Temperature,	°C	25.6	25.0	26.7	26.7
Total Fuel Sulfur,	mg/km	30.41	29.83	20.10	20.12
Avg. Exh. Oxygen,	%	--	8.06	--	8.44
Carbon Dioxide,	g/km	423.3	416.8	283.7	284.8
Fuel Cons.,	ℓ/100 km	18.68	18.32	12.35	12.36
Regulated Emissions					
Hydrocarbons (THC),	g/km	1.08	1.12	0.54	0.65
Carbon Monoxide,	g/km	7.02	5.61	2.47	1.79
Oxides of Nitrogen,	g/km	0.62	0.67	0.68	0.77
Particulates					
Total Particulates		36.17	44.31	29.92	27.95
Compound Group Totals					
Aldehydes & Ketones		6.5	9.1	4.8	4.8
Individual Hydrocarbons		421.2	431.6	238.4	251.3
Organic Sulfides		0.00	0.00	0.00	0.00
Organic Amines		0.00	0.00	0.00	0.00
Other Compounds					
Ammonia		5.06	3.38	2.61	3.91
Cyanide & Cyanogen		0.63	0.98	0.77	0.99
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Nitrous Oxide		7.28	6.10	8.25	8.43
Aldehydes & Ketones					
Formaldehyde		5.38	7.37	3.59	4.53
Acetaldehyde		1.14	1.68	1.14	0.25
Acetone		0.00	0.00	0.00	0.00
Methylethylketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.00

TABLE F-4 (Cont'd). CAR 04 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	041-042	046	041-042	046
Individual Hydrocarbons				
Methane	133.70	121.63	76.15	76.32
Ethylene	82.93	85.20	50.52	51.61
Ethane	42.76	42.30	26.36	25.91
Acetylene	18.43	45.56	9.24	9.09
Propane	2.55	0.95	1.32	0.44
Propylene	29.75	28.27	18.25	17.73
Benzene	37.29	33.34	20.55	22.48
Toluene	73.81	74.39	35.98	47.70
Organic Sulfides				
Carbonyl Sulfide	0.00	0.00	0.00	0.00
Methyl Sulfide	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sodium	0.00	0.01	0.00	0.00
Sulfur	0.07	0.13	0.09	0.16
Vanadium	0.00	0.00	0.00	0.00
Magnesium	0.00	0.02	0.01	0.01
Chlorine	0.02	0.01	0.02	0.01
Aluminum	0.01	0.01	0.01	0.00
Manganese	0.00	0.00	0.00	0.00
Zinc	0.02	0.07	0.00	0.04
Silicon	0.92	0.16	1.17	0.79
Calcium	0.06	0.04	0.05	0.03
Iron	0.54	0.43	0.31	0.21
Phosphorus	0.02	0.05	0.01	0.03
Titanium	0.00	0.00	0.03	0.01
Bromine	0.12	0.13	0.00	0.11

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-5. CAR 05 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	051-052	056-057	051-052	056-058
Barometer,	mm Hg	738.7	736.4	738.3	741.1
Humidity,	g/kg	10.3	7.9	10.9	8.1
Temperature,	°C	23.6	25.6	25.6	24.7
Total Fuel Sulfur,	mg/km	21.50	20.31	12.73	12.71
Avg. Exh. Oxygen,	%	0.49	0.93	0.17	0.17
Carbon Dioxide,	g/km	302.4	285.9	180.1	180.3
Fuel Cons.,	ℓ/100 km	13.21	12.48	7.82	7.81
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.38	0.38	0.24	0.24
Carbon Monoxide,	g/km	3.68	3.34	1.54	1.17
Oxides of Nitrogen,	g/km	0.50	0.55	0.29	0.30
Particulates					
Total Particulates		8.38	2.02	2.14	2.73
Compound Group Totals					
Aldehydes & Ketones		2.6	1.3	0.7	0.2
Individual Hydrocarbons		200.9	182.8	124.0	123.6
Organic Sulfides		0.11	0.04	0.02	0.04
Organic Amines		0.00	0.00	0.00	0.00
Other Compounds					
Ammonia		19.04	31.49	6.50	20.83
Cyanide & Cyanogen		0.72	0.85	0.53	0.45
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Nitrous Oxide		106.11	122.66	91.53	116.35
Aldehydes & Ketones					
Formaldehyde		1.75	0.41	0.50	0.02
Acetaldehyde		0.85	0.82	0.17	0.13
Acetone		--	0.00	0.00	0.00
Methylethylketone		0.00	0.12	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.00

TABLE F-5 (Cont'd). CAR 05 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	051-052	056-057	051-052	056-058
Individual Hydrocarbons				
Methane	54.61	52.37	27.49	27.75
Ethylene	42.40	35.39	31.45	30.57
Ethane	12.84	12.17	8.20	8.65
Acetylene	3.80	2.94	0.00	0.00
Propane	1.02	0.58	0.14	0.37
Propylene	17.94	15.32	16.11	16.49
Benzene	30.55	26.22	17.07	16.09
Toluene	37.78	37.83	23.49	23.67
Organic Sulfides				
Carbonyl Sulfide	0.09	0.04	0.01	0.03
Methyl Sulfide	0.01	0.01	0.01	0.01
Ethyl Sulfide	0.01	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sodium	0.00	0.00	0.00	0.00
Sulfur	0.05	0.04	0.02	0.03
Vanadium	0.00	0.00	0.00	0.00
Magnesium	0.01	0.01	0.00	0.01
Chlorine	0.05	0.01	0.01	0.01
Aluminum	0.02	0.00	0.00	0.00
Manganese	0.00	0.00	0.00	0.00
Zinc	0.00	0.00	0.00	0.00
Silicon	0.04	0.02	0.00	0.01
Calcium	0.12	0.09	0.02	0.06
Iron	0.50	0.21	0.08	0.17
Phosphorus	0.02	0.02	0.01	0.01
Titanium	0.00	0.00	0.11	0.01
Bromine	0.21	0.20	0.00	0.16

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-6. CAR 06 AVERAGE FTP AND HFET RESULTS
FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rate, mg/km (Except at Noted)			
	FTP		HFET	
	As-Received	After Tune-Up	As-Received	After Tune-Up
Test No. VVT	061-062	066-068	061-062	066-067
Barometer, mm Hg	751.7	748.3	751.8	738.5
Humidity, g/kg	6.4	7.7	7.0	7.8
Temperature, °C	23.9	24.7	25.3	24.5
Total Fuel Sulfur, mg/km	20.22	20.79	14.51	15.05
Avg. Exh. Oxygen, %	0.98	1.33	0.87	0.79
Carbon Dioxide, g/km	275.0	284.3	207.0	214.7
Fuel Cons., ℓ/100 km	12.42	12.77	8.91	9.24
Regulated Emissions				
Hydrocarbons (THC), g/km	0.54	0.48	0.12	0.10
Carbon Monoxide, g/km	9.11	8.52	0.86	0.94
Oxides of Nitrogen, g/km	2.16	0.68	2.93	0.68
Particulates				
Total Particulates	19.28	17.71	11.72	11.44
Compound Group Totals				
Aldehydes & Ketones	3.6	2.6	1.1	1.0
Individual Hydrocarbons	237.8	226.3	55.8	52.9
Organic Sulfides	0.05	0.04	0.03	0.02
Organic Amines	0.00	0.00	0.00	0.00
Other Compounds				
Ammonia	13.51	6.80	10.20	3.40
Cyanide & Cyanogen	5.77	1.99	2.12	0.39
Hydrogen Sulfide	0.00	0.05	0.00	0.00
Nitrous Oxide	145.01	42.69	91.66	24.63
Aldehydes & Ketones				
Formaldehyde	1.13	1.22	0.10	0.60
Acetaldehyde	2.14	1.21	0.70	0.41
Acetone	0.00	0.00	0.26	0.00
Methylethylketone	0.25	0.11	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00

TABLE F-6 (Cont'd). CAR 06 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	061-062	066-068	061-062	066-067
Individual Hydrocarbons				
Methane	54.21	55.71	22.82	22.41
Ethylene	45.12	44.15	10.62	9.78
Ethane	9.69	12.06	4.88	4.93
Acetylene	15.08	17.67	0.00	0.00
Propane	0.37	1.83	0.00	0.75
Propylene	22.76	17.15	3.71	2.82
Benzene	32.04	27.32	5.38	5.23
Toluene	58.54	50.37	8.35	6.92
Organic Sulfides				
Carbonyl Sulfide	0.05	0.02	0.03	0.01
Methyl Sulfide	0.00	0.01	0.00	0.01
Ethyl Sulfide	0.01	0.01	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sodium	0.00	0.00	0.00	0.00
Sulfur	0.04	0.04	0.02	0.03
Vanadium	0.01	0.00	0.00	0.00
Magnesium	0.01	0.02	0.01	0.01
Chlorine	0.00	0.01	0.00	0.10
Aluminum	0.03	0.03	0.01	0.00
Manganese	0.04	0.00	0.00	0.00
Zinc	0.01	0.02	0.00	0.00
Silicon	0.01	0.03	0.01	0.02
Calcium	0.04	0.17	0.02	0.00
Iron	0.37	0.20	0.13	0.11
Phosphorus	0.03	0.02	0.01	0.01
Titanium	0.00	0.00	0.00	0.00
Bromine	0.09	0.06	0.05	0.21

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-7. CAR 07 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	071-072	076-078	071-072	076-078
Barometer,	mm Hg	742.1	745.3	742.3	744.6
Humidity,	g/kg	5.6	6.2	5.4	7.0
Temperature,	°C	23.9	23.9	25.0	27.0
Total Fuel Sulfur,	mg/km	27.40	26.48	17.26	17.75
Avg. Exh. Oxygen,	%	4.18	5.13	4.98	4.99
Carbon Dioxide,	g/km	380.1	367.9	245.7	252.6
Fuel Cons.,	ℓ/100 km	16.83	16.26	10.60	10.91
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.40	0.41	0.11	0.13
Carbon Monoxide,	g/km	8.22	7.57	1.45	1.60
Oxides of Nitrogen,	g/km	0.45	0.44	0.37	0.36
Particulates					
Total Particulates		30.79	38.04	20.44	24.94
Compound Group Totals					
Aldehydes & Ketones		7.7	8.5	5.3	7.7
Individual Hydrocarbons		234.3	215.2	66.2	73.5
Organic Sulfides		0.08	0.04	0.07	0.02
Organic Amines		0.00	0.00	0.00	0.00
Other Compounds					
Ammonia		2.64	12.68	4.54	3.79
Cyanide & Cyanogen		0.70	0.27	0.22	0.17
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Nitrous Oxide		2.39	3.45	2.28	2.49
Aldehydes & Ketones					
Formaldehyde		6.36	7.68	4.57	6.61
Acetaldehyde		1.33	0.84	0.75	1.03
Acetone		0.00	0.00	0.00	0.00
Methylethylketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.00

TABLE F-7 (Cont'd). CAR 07 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	071-072	076-078	071-072	076-078
Individual Hydrocarbons				
Methane	89.27	70.33	19.41	20.98
Ethylene	48.45	52.35	24.02	26.17
Ethane	12.15	10.43	3.81	3.28
Acetylene	8.66	7.71	0.72	1.67
Propane	0.58	0.13	0.00	0.00
Propylene	16.47	16.48	5.49	5.76
Benzene	21.17	20.95	6.07	6.83
Toluene	37.56	36.85	6.67	8.81
Organic Sulfides				
Carbonyl Sulfide	0.05	0.02	0.05	0.01
Methyl Sulfide	0.01	0.01	0.02	0.01
Ethyl Sulfide	0.02	0.01	0.00	0.01
Methyl Disulfide	0.01	0.01	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sodium	0.03	0.00	0.00	0.00
Sulfur	0.10	0.10	0.17	0.53
Magnesium	0.02	0.01	0.01	0.01
Chlorine	0.02	0.01	0.01	0.01
Aluminum	0.03	0.02	0.01	0.01
Zinc	0.03	0.01	0.01	0.00
Silicon	0.09	0.01	0.01	0.03
Calcium	0.22	0.08	0.05	0.04
Iron	0.32	0.10	0.06	0.02
Phosphorus	0.02	0.01	0.01	0.01
Arsenic	0.04	0.00	0.00	0.00
Molybdenum	0.27	0.28	0.27	0.08
Tungsten	0.00	0.00	0.04	0.00
Strontium	0.16	0.19	0.17	0.04

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-8. CAR 08 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	081-082	086-087	081-082	086-087
Barometer,	mm Hg	745.1	742.7	745.7	742.6
Humidity,	g/kg	6.8	11.4	7.5	11.8
Temperature,	°C	25.6	25.0	26.2	25.9
Total Fuel Sulfur,	mg/km	20.80	20.52	13.70	13.92
Avg. Exh. Oxygen,	%	2.93	1.35	2.58	0.85
Carbon Dioxide,	g/km	293.7	279.3	192.7	197.8
Fuel Cons.,	ℓ/100 km	12.78	12.60	8.41	8.55
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.28	0.52	0.07	0.14
Carbon Monoxide,	g/km	3.07	9.10	0.16	1.36
Oxides of Nitrogen,	g/km	2.09	0.71	2.57	0.79
Particulates					
Total Particulates		19.90	37.66	12.29	16.29
Compound Group Totals					
Aldehydes & Ketones		5.3	1.6	3.3	0.6
Individual Hydrocarbons		106.9	239.8	22.0	62.3
Organic Sulfides		0.06	0.07	0.02	0.01
Organic Amines		0.00	0.00	0.00	0.00
Other Compounds					
Ammonia		6.74	3.93	3.23	3.72
Cyanide & Cyanogen		1.22	2.09	0.20	0.44
Hydrogen Sulfide		0.00	0.02	0.00	0.00
Nitrous Oxide		38.86	31.78	18.88	28.12
Aldehydes & Ketones					
Formaldehyde		5.31	1.27	2.32	0.60
Acetaldehyde		0.00	0.30	0.00	0.00
Acetone		0.00	0.00	0.00	0.00
Methylethylketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.92	0.00

TABLE F-8 (Cont'd). CAR 08 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	081-082	086-087	081-082	086-087
Individual Hydrocarbons				
Methane	21.35	51.62	7.34	21.18
Ethylene	24.60	49.87	5.99	12.92
Ethane	6.53	13.29	2.22	5.49
Acetylene	5.92	15.37	0.00	0.00
Propane	0.14	0.57	0.00	0.00
Propylene	9.71	21.97	0.00	0.00
Benzene	11.21	30.29	0.00	5.22
Toluene	27.46	56.82	2.07	6.92
			4.32	10.57
Organic Sulfides				
Carbonyl Sulfide	0.02	0.03	0.02	0.01
Methyl Sulfide	0.02	0.03	0.00	0.00
Ethyl Sulfide	0.03	0.01	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sulfur	0.06	0.03	0.20	0.04
Magnesium	0.01	0.01	0.01	0.01
Chlorine	0.01	0.01	0.01	0.01
Aluminum	0.04	0.02	0.02	0.01
Potassium	0.00	0.00	0.03	0.00
Zinc	0.01	0.01	0.00	0.01
Silicon	0.02	0.01	0.01	0.01
Calcium	0.06	0.04	0.07	0.04
Iron	0.49	0.09	0.14	0.07
Phosphorus	0.01	0.00	0.01	0.01
Arsenic	0.02	0.00	0.00	0.00
Molybdenum	0.17	0.23	0.06	0.15
Tungsten	0.02	0.03	0.00	0.03
Strontium	0.12	0.14	0.03	0.12

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[a] This table excludes elements having measured values consistently below 0.01 mg/km

TABLE F-9. CAR 09 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	091-092	096	091-092	096
Barometer,	mm Hg	741.8	734.1	742.3	733.6
Humidity,	g/kg	11.3	13.6	11.2	12.6
Temperature,	°C	24.5	23.9	24.7	26.1
Total Fuel Sulfur,	mg/km	12.59	12.39	8.38	8.17
Avg. Exh. Oxygen,	%	7.49	7.43	6.89	7.07
Carbon Dioxide,	g/km	177.4	175.1	120.0	117.2
Fuel Cons.,	ℓ/100 km	7.73	7.61	5.15	5.02
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.40	0.34	0.14	0.10
Carbon Monoxide,	g/km	1.60	1.38	0.11	0.08
Oxides of Nitrogen,	g/km	1.86	1.80	2.08	1.77
Particulates					
Total Particulates		35.09	33.42	29.46	19.86
Compound Group Totals					
Aldehydes & Ketones		1.7	1.3	0.9	2.4
Individual Hydrocarbons		99.5	104.9	30.4	--
Organic Sulfides		0.03	0.01	0.00	0.00
Organic Amines		0.00	0.00	0.00	0.00
Other Compounds					
Ammonia		2.43	2.19	1.37	2.49
Cyanide & Cyanogen		0.21	0.35	0.25	0.31
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Nitrous Oxide		9.39	6.54	7.28	5.64
Aldehydes & Ketones					
Formaldehyde		1.70	1.34	0.90	2.45
Acetaldehyde		0.00	0.00	0.00	0.00
Acetone		0.00	0.00	0.00	0.00
Methylethylketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.00

TABLE F-9 (Cont'd). CAR 09 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

	Average Emission Rates, mg/km			
	FTP		HFET	
	Received	Tune-Up	Received	Tune-Up
Test No.	091-092	096	091-092	096
Individual Hydrocarbons				
Methane	24.56	32.90	6.17	--
Ethylene	24.76	25.00	14.70	--
Ethane	9.80	10.27	4.11	--
Acetylene	6.78	4.95	0.00	--
Propane	0.52	0.00	0.02	--
Propylene	5.07	4.44	1.84	--
Benzene	7.82	6.13	2.09	--
Toluene	20.23	21.25	1.45	--
Organic Sulfides				
Carbonyl Sulfide	0.02	0.01	0.00	0.00
Methyl Sulfide	0.01	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Sulfur	0.26	0.08	2.31	0.47
Vanadium	0.01	0.01	0.01	0.00
Chlorine	0.00	0.01	0.00	0.01
Aluminum	0.01	0.01	0.01	0.00
Potassium	0.00	0.00	0.00	0.01
Zinc	0.01	0.04	0.01	0.00
Silicon	0.02	0.00	0.01	0.00
Calcium	0.06	0.08	0.03	0.03
Iron	0.05	0.19	0.00	0.03
Phosphorus	0.00	0.02	0.00	0.00
Arsenic	0.00	0.00	0.00	0.00
Molybdenum	0.25	0.18	0.17	0.00
Tungsten	0.00	0.05	0.00	0.00
Strontium	0.15	0.16	0.12	0.07

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[a] This table excludes all elements having measured values consistently below 0.01 mg/km.

TABLE F-10. CAR 10 AVERAGE FTP AND HFET RESULTS FOR THE AS RECEIVED AND AFTER TUNE-UP TESTS

		Average Emission Rate, mg/km (Except at Noted)			
		FTP		HFET	
		As-Received	After Tune-Up	As-Received	After Tune-Up
Test No.	VVT	101	106-107	101	106-107
Barometer,	mm Hg	744.7	737.3	744.7	737.7
Humidity,	g/kg	12.6	11.7	11.8	10.7
Temperature,	°C	25.6	24.5	31.1	26.2
Total Fuel Sulfur,	mg/km	31.45	29.19	19.94	19.48
Avg. Exh. Oxygen,	%	--	1.26	--	1.78
Carbon Dioxide,	g/km	384.6	401.4	282.1	278.9
Fuel Cons.,	ℓ/100 km	19.32	17.93	12.25	11.97
Regulated Emissions					
Hydrocarbons (THC),	g/km	2.84	0.83	0.38	0.15
Carbon Monoxide,	g/km	37.60	10.15	2.33	0.67
Oxides of Nitrogen,	g/km	2.28	1.88	1.49	1.23
Particulates					
Total Particulates		264.23	83.41	71.46	61.89
Compound Group Totals					
Aldehydes & Ketones		19.8	6.0	8.1	2.1
Individual Hydrocarbons		1262.1	470.6	290.2	71.2
Organic Sulfides		0.03	0.03	0.01	0.03
Organic Amines		0.00	0.00	0.00	0.00
Other Compounds					
Ammonia		3.29	4.30	1.77	2.28
Cyanide & Cyanogen		1.91	0.23	0.12	0.12
Hydrogen Sulfide		0.25	0.27	0.13	0.06
Nitrous Oxide		12.94	12.93	13.01	8.53
Aldehydes & Ketones					
Formaldehyde		17.01	5.81	6.44	1.68
Acetaldehyde		2.82	0.18	1.66	0.40
Acetone		0.00	0.00	0.00	0.00
Methylethylketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.00